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Problems involved in providing homes for independent living for the physically handicapped, health impaired, or older adults are considered. Basic concepts of low rent housing preface a discussion of neighborhoods and site selection, access, ramps, pedestrian walks, parking, landscaping, and lighting. Guides for building design focus on entrances, corridors, stairs, elevators, incinerator chutes, laundry facilities, general storage, and mailboxes. Specifications are suggested for living units including the living room, kitchen, bedroom, bathroom, and storage area; the design of windows, doors, hallways, floors, lighting and heating units, and custodial quarters, and the provision of telephones, televisions, an emergency signal system, and hot water are also treated. Recommendations are made for the following community areas: lounge, recreation room, kitchen, craft area, library, health clinic, washrooms, public telephones, drinking fountains, vending machines, and other areas. A bibliography lists 41 references. (RJ)

Housing for the Physically Impaired

A GUIDE FOR PLANNING AND DESIGN

U. S. DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT

"Now is the time to direct the productive capacity of our home building industry to the great needs of the neglected segments of our population . . . attention can be given to special housing needs, such as those of our physically handicapped."

Lyndon B. Johnson

Housing for the Physically Impaired

A GUIDE FOR PLANNING AND DESIGN

Robert C. Weaver, Secretary

S. L. Tesone, Architectural Adviser

U. S. DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT

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A significant number of our fellow Americans suffer both from poverty and physical impairments. One of the things they all too often are unable to afford is decent housing, and which would be suitable for handicapped persons.

Fortunately, President Johnson and the Congress have recognized the plight of the physically impaired and have taken steps to improve their living conditions. Particularly in the Housing Acts of 1964 and 1965, specific provisions were incorporated to provide good housing for handicapped persons of low and moderate income at prices they can afford and which will be designed to improve their ability to live independently.

Although this Guide cannot anticipate every problem, and creative imagination and dedication to the purpose are needed to translate guidelines into accomplishments, it was prepared to help those who are interested and involved in the development of better housing for handicapped Americans. We hope it will be useful.

Robert C. Weaver, Secretary

Foreword

The blind, the amputee, the victims of cerebral palsy and numerous others disabled by illnesses or injuries and by old age are people we want to help.

The physically impaired have always been with us. In the past 20 years, or so, through research and other means, the incidents of disabling conditions are being reduced or ameliorated. This, together with vastly improved orthopedic and prosthetic devices, is helping many impaired persons to get about, to enjoy life more. Expanded vocational rehabilitation and training techniques are helping thousands of formerly dependent individuals to become economically self-sufficient.

Unfortunately, however, many impaired persons live in dwellings and related environments with architectural barriers which limit their ability to take care of themselves and to live more independently to the limit of their individual physical capacity.

Housing for the Physically Impaired is dedicated to increasing and improving the housing supply for impaired people with limited incomes. It attempts to clarify some of the problems involved in providing homes for *independent living* for this segment of our population and points the way to some solutions. The Guide is advisory in nature and not intended to be a set of rigid specifics to be followed word for word.

Acknowledgments

My thanks and appreciations to the numerous staff members who have been so helpful in commenting on the several drafts.

I am grateful to the following persons for their editorial assistance: Mary A. Crawford, Arthur E. Rosfeld and Eleanor T. Vaughan.

My appreciation also to my secretary, Vivian House, for the dedication, willingness and patient help during the research and writing of this Guide.

To all my many handicapped friends who have for the past 24 years been my teachers, including my most ardent critic and daughter Elizabeth, my thanks for having given me much insight of your many problems. Without this background, I would have been greatly disadvantaged in the effort to produce this Guide.

Finally, but not the least, my special *thank you* to each of the following reviewers and contributors:

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Line drawings by the Architectural Adviser.

S. L. Tesone, Architectural Adviser, 1967.

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Introduction

The DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT (HUD) has a number of programs to assist in the housing of physically handicapped or disabled persons. The programs vary mainly in the type of financing they involve and the income groups they serve.

The FEDERAL HOUSING ADMINISTRATION (FHA), an agency within HUD, administers some *mortgage insurance programs* with special provisions for the elderly and handicapped persons. Under Sections 221 and 231 of the National Housing Act, the FHA insures mortgages to finance the construction and rehabilitation of rental housing for the elderly or handicapped. To be eligible under Section 231, a rental housing project must include eight or more units, of which half or more must be specifically designed for the elderly or handicapped.

The FHA also administers a rent supplement program, authorized by Section 101 of the Housing and Urban Development Act of 1965. This program provides for the *payment of rent supplements* to housing owners on behalf of low-income families or individuals, including the elderly and the handicapped. The amount of a supplement may not exceed the amount by which the fair market rental for the unit occupied exceeds one-fourth of the tenant's income.

A *demonstration grant program,* under HUD, with special provisions for the handicapped, is authorized by Section 207 of the Housing Act of 1961. Under this program, the office of Urban Technology and Research makes grants to public or private groups "for the purposes of developing and demonstrating new or improved means of providing housing for low-income persons and families, and of demonstrating the types of housing and the means of providing housing that will assist low-income persons or families who qualify as handicapped families." Thus, various aspects of providing new and existing housing for low-income families may be developed and put into trial use. These aspects include design, construction methods, land planning, and financing methods.

The HOUSING ASSISTANCE ADMINISTRATION (HAA), under the Assistant Secretary for Renewal and Housing Assistance, administers two other HUD programs which benefit the elderly and the handicapped. They are: direct loans for housing, and low-rent housing.

The *direct loans program* is authorized by Section 202 of the Housing Act of 1959. This program provides for low interest, long-term direct loans to nonprofit applicants sponsored by church groups, labor unions, fraternal or civic clubs and others which build housing and related facilities for elderly or handicapped.

Low-rent Housing

The *low-rent program* is authorized by the United States Housing Act of 1937 (USHAct). It is the chief means of providing housing for the disabled and handicapped. This Guide has been prepared for Local Housing Authorities (LHAs), architects, and others to use in connection with low-rent housing projects designed for physically impaired persons under the USHAct program. This material, however, should be of interest to all persons concerned with providing housing for the elderly or the impaired regardless of financing methods.

General. The USHAct authorizes a program of financial assistance to local communities so that they can provide decent, safe and sanitary housing for families that cannot afford standard housing available in the private market.

The housing project may involve new construction; acquisition, or acquisition and rehabilitation of existing housing; or leasing of existing housing. All projects are initiated, planned and carried through by LHAs, public corporate bodies authorized by the local governing body to function pursuant to state law, for the purpose of developing, owning and managing low-rent projects. Financial assistance, which consists of loans and annual contributions, is made available to, or through, such LHAs.

For projects of new construction or acquisition, preliminary and temporary financing is provided through loans made directly by HUD or by private investors, based on the security of a HUD commitment. For permanent financing, LHAs sell to the public long-term bonds secured by a HUD pledge to pay annual contributions.

New Housing Construction. The LHA may accomplish new housing construction by the conventional method of engaging a private contractor, or by contracting with a private developer to buy, upon completion, new housing he has built. The latter is known as the "turnkey" method.

Acquisition of Existing Housing. The LHA may acquire standard or substandard properties and have the property reconditioned either by its own work force or by private contractors. It may also enter into agreements with private builders, rehabilitators, or others to purchase reconditioned properties, at an agreed price, after the properties have been brought up to standard condition ("turnkey" method).

Leasing of Existing Housing. Under Sections 23 and 10(c) of the USHAct, LHAs may enter into leasing agreements with property owners for occupancy by eligible low-income families. Annual contributions by HUD provide the difference between the rent the owner receives and that paid by the tenant. Such annual contributions cannot exceed the rate of fixed annual contributions allowable in the same community for a newly constructed project having comparable numbers, sizes, and kinds of families. Besides adding to the available supply of low-rent housing, such leasing activities can also serve to rehabilitate properties and upgrade neighborhoods where the owner makes necessary improvements in substandard dwellings to lease his property to the LHA.

Combined Low- and Middle-Income Housing. Occupancy by low-income families and those of higher income in the same housing development may be provided through joint sponsorship of housing projects by private entities and LHAs. Joint sponsorship could mean a joint enterprise between a private profit or nonprofit organization and an LHA, whereby moderate-income families would be housed according to terms arranged by the private owner, and low-income families would be housed with financial assistance from HUD. The LHA could either lease a certain number of apartments or houses in the development or own an undivided interest in the development.

This arrangement permits subsidized low-income families to live among tenants of moderate circumstances without being identified as receiving assistance. Only in the recordkeeping need the status be noted.

Special provisions for the Handicapped and Disabled. The USHAct contains special provisions which apply, among others, to families of which the head, or the spouse, or the sole member, is a disabled person as defined in Section 223 of the Social Security Act, or is handicapped within the meaning of Section 202 of the Housing Act of 1959.

Section 223 of the Social Security Act defines "disability" as "inability to engage in any substantial gainful activity by reason of any medically determinable physical or mental impairment which can be expected to result in death or to be of long-continued and indefinite duration."

A person is "handicapped," within the meaning of the Housing Act of 1959, when he has been determined to have a physical impairment which "(A) is expected to be of long-continued and indefinite duration, (B) substantially impedes his ability to live independently, and (C) is of such a nature that such ability could be improved by more suitable housing conditions."

The following special provisions of the USHAct apply to the disabled, handicapped and elderly:

- Generally only "families" are eligible for admission, but the handicapped, disabled and elderly single persons are also eligible.

- The statutory maximum limit on dwelling construction and equipment costs per room is $1,100 more for dwellings designed specifically for the handicapped, disabled and elderly than the basic statutory room cost limits. (Special additional room cost limits apply in Alaska.) If leased accommodations can be shown to be designed specifically for these groups, the maximum annual contribution could be the higher rate of fixed annual contribution for such a newly constructed project.

- In recognition of the very low incomes of the handicapped, disabled and elderly, an additional operating subsidy of as much as $120 per dwelling unit per year is authorized for units so occupied when such amount is necessary to meet two objectives: rents they can afford, and a solvent project operation.

- In adopting regulations establishing admission policies, LHAs are required to fully consider certain factors, including an applicant's physical impairments.

- The handicapped, disabled and elderly are exempt from the requirement that a gap of at least 20% be left between the upper rental limits for admission to the proposed low-rent housing and the lowest rents at which private enterprise, unaided by public subsidy, is providing a substantial supply of decent, safe and sanitary housing.

Although the USHAct defines the "handicapped" and the "disabled" separately, this Guide is written for the physical needs of both groups collectively; therefore, the term *"physically impaired"* will be used as embracing both the "handicapped" and the "disabled."

Low-rent Housing for the Physically Impaired Basic Concepts

Concentration of Dwellings

In our present urban society, it has been well established that large concentrations of any special group are less desirable, for their own and for the general welfare, than arrangements that permit a stimulating mixture of persons with varied backgrounds.

There has been little experience to date in planning for occupancy by the physically impaired in housing developments of any kind. However, there is general agreement, among experts, on the problems confronted by the physically impaired, that concentrations which would segregate incapacitated persons are not desirable.

Until there has been sufficient experience for a different approach, *housing provided for the physically impaired should be a part of projects housing others, that is, regular families and/or the elderly.* It is the opinion of some experts that housing the impaired with others in the same age group deserves sympathetic consideration.

Factors that favor reasonable concentrations of a particular physically impaired population are cost, convenience, and indications that some impaired individuals can benefit from the psychological support of close association with those similarly afflicted.

In planning the inclusion of some specially designed dwellings in the same structures with other dwellings of conventional design, consideration should be given to the extra cost of special design features in the common-use portion of the structure or site improvements.

For example, increased corridor width, ramps (not steps) at all entrance doors and sidewalks, and, in high-rise structures, automatic door openers at entrances. There should be enough specially designed dwellings to reasonably justify the additional cost of such comon-use items.

Locations close to public and private facilities and services, public transportation, and concentrations of employment are highly desirable for housing that mixes dwellings for the physically impaired with others.

Nature of the Physically Impaired Person

The first concern in planning a housing environment for any special group, quite properly, is the particular nature of that group. What is the group's range of limitations and abilities? What precise livability objective is to be achieved? In considering persons of limited physical abilities, terms are often used loosely. Such persons may be referred to as: disabled, handicapped or physically impaired.

For the purpose of this Guide, manifestation of physical impairment could be grouped into six categories:

- Nonambulatory, persons confined to wheelchairs.
- Semiambulatory, persons who walk with difficulty or insecurity. Individuals using canes, crutches or braces; amputees, arthritics, spastics and those with pulmonary or cardiac ills.
- Blindness or limited vision, persons using the long Hoover cane or Seeing Eye dog.
- Deafness or limited hearing, persons insecure in public areas, crowds and moving traffic.
- Incoordinations, persons often with faulty balance due to palsy from brain, spinal or peripheral nerve injury.
- Aging.

A National Health Survey by HEW [1] reports that of the 80.3 million persons with one or more chronic conditions or impairments the average per person was two. These chronic conditions limit the activities of 22.2 million persons. Cardiovascular leads in the number of persons afflicted with 5.5 million, of which there are 3.6 million heart conditions; followed by arthritis and rheumatism 3.3 million; digestive system 2.1 million; mental and nervous 1.7 million; back and spine impairments (except paralysis) 1.7 million; hips and lower extremities (except paralysis) 1.4 million; visual 1.2 million; asthma and hay fever 1.1 million; genitourinary system 1.1 million; paralysis 900 thousand; muscle, bone and joint disorders not listed above 800 thousand. Liberty has been taken to round out the above figures—eight other disorders are listed.

It should be of interest to the architect and other related professionals that this housing is for those with ability to live independently, with little or occasional help, as individuals or as a physically impaired husband, wife or both. Inadequate housing environment has caused a great many people with physical impairments to live dependently.

Housing Authority of the City of San Antonio.

[1] *Chronic Conditions and Activity Limitations, U.S. July 1961-June 1963, pages 3 and 27.*

The primary objective of the low-rent housing program for the impaired is to reduce that dependency to the greatest extent possible. All recommendations made in this Guide are based on the objective of independent living.

Housing Objectives under the Low-Rent Housing Program

Generally, housing designed for the physically impaired will be rental housing [2] owned and operated by the Local Housing Authority. It may vary from high-rise apartment buildings to scattered individual cottage-type dwellings, to older housing built for other purposes and rehabilitated or remodeled for the use of the physically impaired, or to dwelling units incorporated into structures designed for the physically unimpaired families or the elderly. Ordinarily, housing provided under this program will be for independent living, that is, each dwelling will be complete with kitchen, dining space and bath.[3]

Over its lifetime, low-rent housing will be occupied by many different families. The dwelling cannot be tailored to each specific type or degree of disability, but must offer maximum variability of occupancy. Sometimes the impaired individual may be the wife, sometimes the husband, and sometimes both.

Since most rental housing for the impaired will see multiple use, many of the recommendations represent compromises between an ideal living arrangement for a person with a specific handicap and one most suitable for the physically impaired in general.

[2] *Combined Low- and Middle-Income Housing is possible, see INTRODUCTION.*

[3] *Some Local Housing Authorities, however, may elect to develop a program for the impaired which provides for group dining. In such instances, the architect is referred to HUD-HAA Low-Rent Housing Manual Sections 207.6 and 207.7 for low-rent housing requirements on space and general planning and design criteria.*

The Local Survey

Reliable statistical data on the impaired and the specialized housing market they represent are scattered and inconclusive. The U.S. Census has not isolated and counted physically impaired persons as a group. A National Health Survey by HEW [4] reports that 22.2 million civilian noninstitutional persons have limited activities resulting from chronic conditions or impairment, of which 4.1 million are unable to perform their major activities; 12 million are limited in the amount and kind of such activities; the rest, 6.1 million, have limitations but not in their major activity. It is significant that the "Survey" found more persons with chronic conditions in families of low income, under $4,000 a year, than in families above that income. The respective number of persons is nearly 11.5 million and 9.5 million.

Dr. Howard Rusk says there are 10 million American women with some homemaking responsibilities who are physically disabled, not including those afflicted by blindness or mental illness.[5] Professor Timothy J. Nugent estimates one out of six (30 million) persons in the United States has a permanent physical disability.[6]

Private health agencies, such as the Heart Association, United Cerebral Palsy, and the National Society for Crippled Children and Adults, have done considerable statistical research within their own specialized fields. In some communities, their figures are available locally. However, since many physicaiiy impaired persons are afflicted with more than one disability, the same individual may be counted by several agencies. The available data from this source therefore tend to be unusable for ascertaining the true extent of housing need.

[4] *Chronic Conditions and Limitations, U.S. July 1961-June 1963, pages 3 and 27.*

[5] *American Vocational Journal, May 1962.*

[6] *National Academy of Sciences-National Research Council-B.R.I. Publication No. 910, page 51, 1961.*

Sources of specific local data on income, disability, present housing, and interest in specialized housing are: welfare and social agencies, both public and private; vocational rehabilitation centers; specialized health agencies; the Local Housing Authority; nursing homes; and religious organizations or union groups involved in housing.

These factors point to the need for a local survey of the physically impaired population to determine the number and eligibility of those expressing housing need. This should be done before programming or planning specialized housing.

Mobility Aids

The limited mobility which characterizes the group and the special aids used to increase that mobility govern the design of housing for the physically impaired. The limited strength and manual dexterity of many of the physically impaired further impede their ability to use ambulatory aids except under desirable conditions.

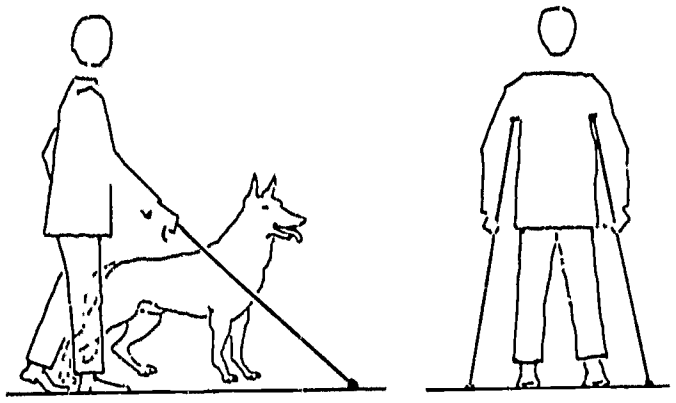

Figure 1. Housing with a total environment to assist the individual's capacity to be or to become self-sufficient.

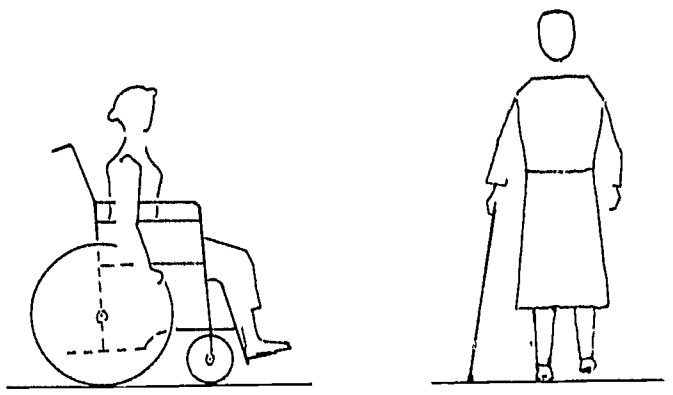

Figure 2. Housing especially designed for independent living within the individual's limitations.

Thus, all factors (project location, buildings, dwellings, grounds' layout and design) must take into account the dimensions, turn-around range, and methods of propelling a wheelchair. Also, the environment must facilitate the use of crutches, body braces, artificial limbs, and for some, the use of canes and Seeing Eye dogs.

The recommendations incorporated in this Guide take special account of mobility factors and aids. It is important, however, for the design team, starting with the very earliest planning stage, to be sensitive to the five most commonly used orthopedic aids: body braces, canes, wheelchairs, crutches and artificial limbs. The planning and details of the dwelling, structures and outdoor areas are affected by the physical limitations of persons using ambulatory aids or limited by arthritis or poor vision, and persons with *low energy* due to a heart condition, tuberculosis, age, etc.

Independent Living

Dependency takes many forms, from public or private financial support of potentially employable persons to institutional care at public or family expense. An individual with a physical impairment may fail to utilize existing community services and facilities, including employment and vocational rehabilitation opportunities, merely because of the difficulty in reaching them. The physical environment within a conventional dwelling adds burdens for most disabled persons to the point of restricting independent living and requiring help with problems of daily living such as bathing, feeding, house cleaning, or avoiding safety hazards.

Such negative environmental factors significantly affect the impaired of low income. The inability to pay standard market rentals often means living in substandard housing and undesirable neighborhoods. The social and economic costs to the nation and the psychological costs to the individual of a dependency-producing environment are enormous.

The challenge for the architect and others planning low-rent housing for the physically impaired is the production of a total environment that will maximize the individual's capacity to be or to become self-sufficient in all possible respects. To the head of the family, this means facilitating income-producing capacity; to the homemaker (man or woman), it means facilitating duties such as: bedmaking, cooking, cleaning, shopping, child care, etc.

Community Space

Interior living space should be complemented and supplemented by a reasonable amount of indoor and outdoor community space.

Physical and social planning of community space is a joint venture to be developed simultaneously by the Local Housing Authority, the architect, and the community welfare council, plus others concerned with operating the social, recreational and clinical programs.

Every member of modern society, including the most advantaged, needs a living environment that permits contact with the facilities and services that suit his requirements. For the physically impaired, community space within or adjoining the housing development, with access for people other than tenants, may be a means of bringing highly specialized social and clincial services. It may also be the realistic answer to their need for social participation.

In recognition of these factors, the low-rent housing program encourages the development of limited community space as a necessary part of housing developments.[7] The floor area or indoor community space, and both the amount and the development of outdoor space, may be increased beyond the program limits when the cost is met by funds from other sources, such as the municipality or other local public or private agencies. Experience in the low-rent housing program has demonstrated the validity of this approach.

Widespread citizen involvement is often the key that unlocks the door to community acceptance of individuals with special needs and problems. Citizen backing also may provide a unifying purpose within the community strong enough to offset any objections to a proposed housing development.

Frequently, in low-rent housing, preliminary social and financing decisions will have been made about conjunctive services before the architect enters the picture. Such preliminary planning, however, may prove inadequate for proper physical planning. It is therefore strongly recommended that the architect be a party, from the start, with the community service agencies that will provide and operate the programs.

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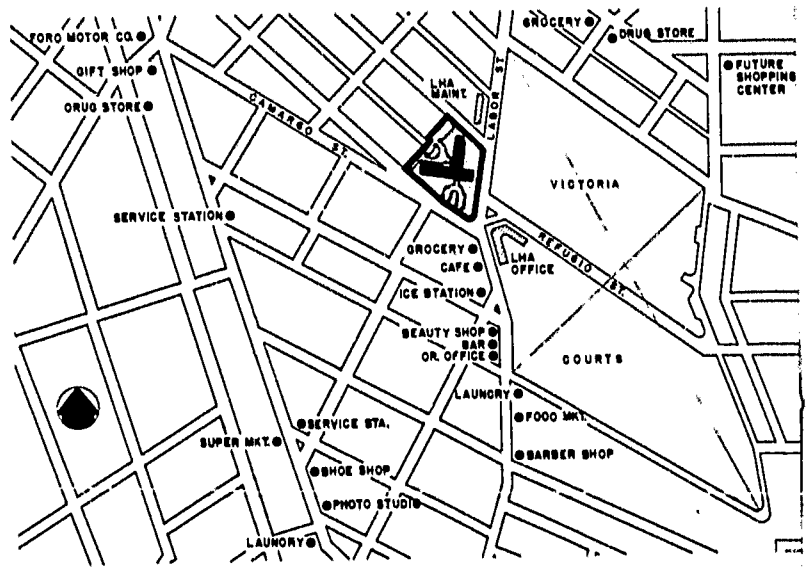
[7] *See HUD-HAA Low-Rent Housing Manual Section 207.3.*

The Neighborhood

Accessibility to community services and facilities is the first factor to consider in site selection.

Primary services and facilities are: employment opportunities; clinics; vocational rehabilitation programs; inexpensive private and public recreation (such as movies, parks "lively" with activities for participation and view, libraries, etc.); churches; stores including drug, grocery and variety; barber and beauty shops; inexpensive restaurants; schools.



Another important factor is accessibility to public transportation. To the employed impaired citizen, as well as to staff and visitors, good public transportation may be a necessity. To the unemployed, good transportation may keep him in touch with the world, participating in meaningful and dignified activities. Economical public transportation with a nearby stop, without intervening hazards, is highly desirable. Such transportation may be either existing or assured by the time the development is first occupied.

A convenient location is so essential for impaired persons that it may outweigh the other standards and criteria for evaluating residential neighborhoods. However, in a development of mixed occupancy (the impaired, the elderly and/or other families), the needs of all persons must be considered. When serious compromises are involved, expert advice would be desirable.

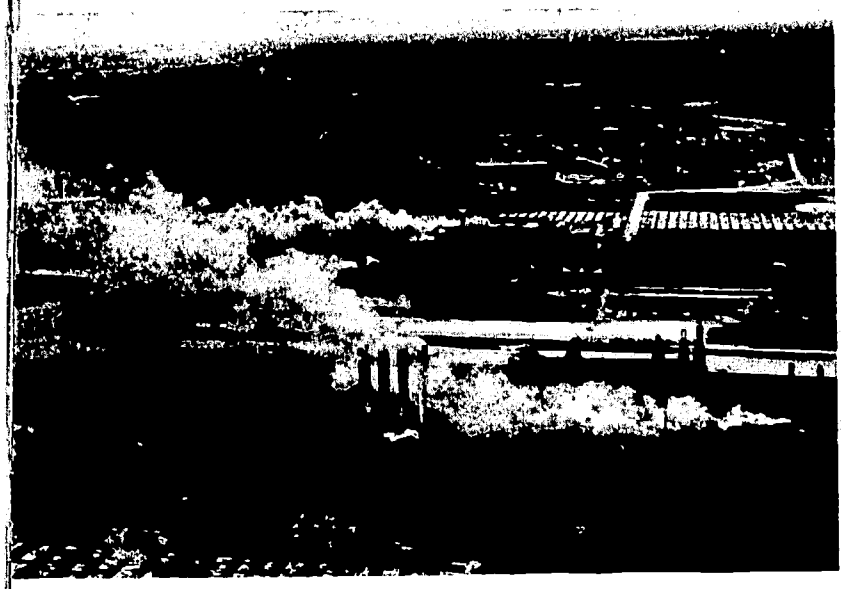
Neighborhoods close to specialized services, such as sheltered workshops, should be considered if the neighborhood also possesses the other more generally used services and facilities. It is easier and less expensive to arrange transportation for a particular group of tenants using a single facility than to bring the multiple, less specialized but equally essential, public and private facilities and services within reach of all tenants.

Urban renewal areas, which contemplate commercial shopping centers and other adjuncts to housing needs, may furnish desirable sites.

The Site

The criteria for selecting residential sites in general should apply.[1] [These criteria cover economy, topography, subsoil conditions, and existing utility services. Sites subject to industrial smoke, traffic hazards, excessive noise, or polluted air should be avoided.]

[1] *HUD-HAA Low-Rent Housing Manual Section 205.1.*



Wayne County Department of Health, Eloise, Mich.

The site should allow for development so that structures can be oriented to give residents the advantages of local climate.

Odd or irregularly shaped sites should be carefully evaluated based on amount of usable land and cost of its maintenance.

If the community has restrictive ordinances, zoning, or other local controls which would adversely affect the proposed development in a particularly good location and site, waivers should be investigated. In applying for such waivers, it is important to remember that the housing is to be residential, designed for independent living. It is neither an institution nor a nursing home.

An important special consideration is slope of the site. For the physically impaired, a comparatively flat site is needed. Steeper and more rugged sites may be used but with doubtful success. Such sites should be evaluated in terms of the costs of any special improvements required to serve the limitations and needs of the tenants. Examples of such extra costs would be those for constructing retaining walls to create useful flat outdoor sitting and resting areas or constructing gently sloping pedestrian ramps throughout the site. Extra maintenance costs (upkeep of banks, lawn areas, and in some climates snow removal, etc.) may result in increased rents.

It is important to have outlooks, both natural and created, that provide interest or beauty and contribute to pleasant living. Many tenants will undoubtedly spend more time at home than would a comparable group of non-impaired individuals. Views of such things as wooded areas, hills, night lights, and distant traffic; of planes, boats, trains and automobiles are desirable, and count as positive factors in site selection.

Consideration should be given to the existing and proposed approaches to the site (street improvement, widening; surface; sidewalks) and public utilities.

Access, Ramps,[2] Pedestrian Walks

Access. All building entrances to be used by the tenants should be approached by paved walks, with nonskid surface, sloped for drainage, but not over 1 in 20 (or 5%). *Steps should not be used.*

Landing platforms at all building entrance doors should be level, sloped only as required for drainage. The platform width should be at least 1′ beyond the door jambs. Platforms

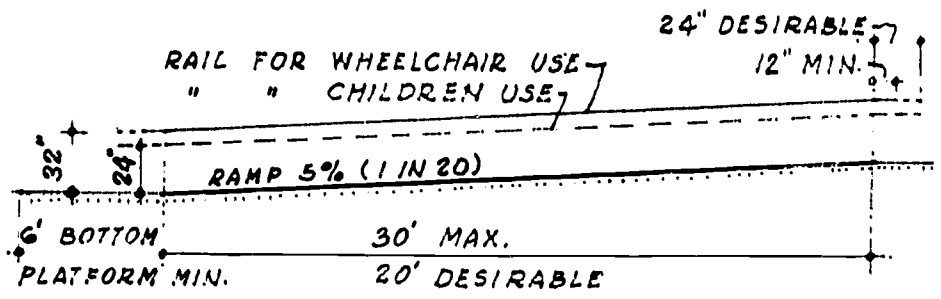


Figure 3. Single Run Entrance Ramp.

should be at least 3′ deep if doors swing in, and 5′ deep if doors swing out, but never less than 3′ beyond the edge of the fully open door.

Ramps. Most wheelchair users can negotiate a ramp sloped 5% or less without assistance. Steeper ramps limit independent chair use. Strong arms and strong grips are necessary to propel a chair on 1 in 12 (or 8.3%) ramps. Such ramps should never be used. They are hazardous not only to wheelchair users, but also to persons with artificial limbs, and to the elderly. *Ramp surfaces* should be fireproof and nonslip.

[2] *Making Buildings and Facilities Accessible to, and Usable by, the Physically Handicapped. American Standards Associations. October 31, 1961.*

Designing for the Disabled, a Manual of Technical Information. Selywyn Goldsmith, MA, ARIBA. London: Royal Institute of British Architects, 1963.

If the vertical height requires two ramps to achieve the properly graded slope, the ramps should be no longer than 20′, separated by a level platform at least 5′–6″ long, to provide ample rest space. Such two-run ramps may be in a straight line; however, a more desirable and safer arrangement would be a 90° or 180° turn at the platform.

When more than two ramp lengths are required, the descent should be broken by turns to be negotiated on level platforms.

The recommended width for a one-way ramp is 3′ between handrails. At least 6′ should be provided for two-way circulation.

Handrails and anchors should support 250 pounds for 5 minutes; extend at least 12″ (24″ is preferable) beyond the beginning and end of the ramp, to assist persons with poor vision; and should be returned to a wall or an upright post for safety.

Handrails installed specifically for children should be at a height of 24″. Local codes or special safety objectives might necessitate the installation of additional higher rails.

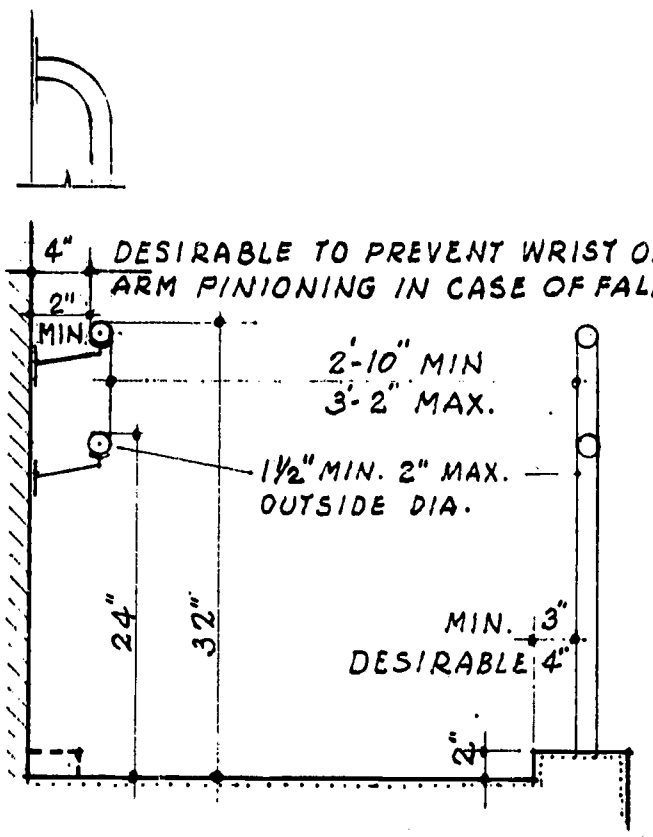


Figure 4. Single Width Ramp for Wheelchair.

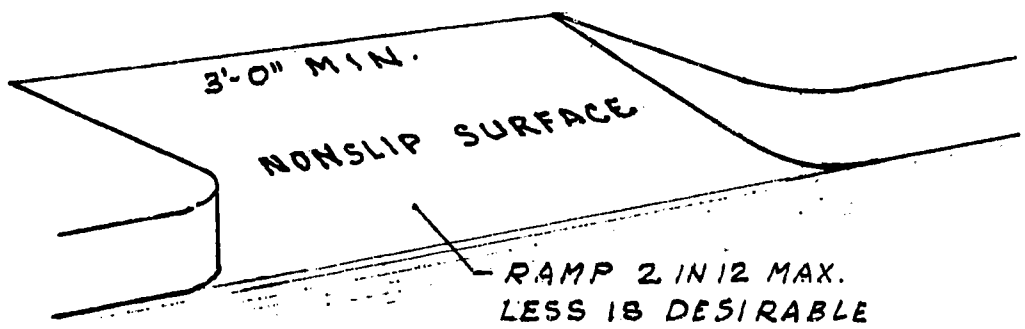


Figure 5. Street Curb Ramp for Wheelchair.

Pedestrian Walks. Pedestrian walks at street curbs should be ramped. The ramp should not protrude onto the street but be indented into the curb; have a nonslip surface colored orange, or curb jambs should be colored to assist those with poor vision. Greater slopes than 2 in 12 could hinder wheelchair use.

Parking

Data on automible ownership by the physically impaired, as a whole, are not a sound basis for determining parking space requirements. Before allocating parking space, a local study should be made of car ownership among eligible applicants.

Local ordinances generally require substantially more parking than needed for the elderly as shown by occupied projects. If the same situation is found to exist for the physically impaired, a waiver of the ordinance, to reduce its parking requirements, may be necessary.

In low-rent housing developments for the elderly, it has been shown that adequate total parking is supplied by providing parking spaces for only 20 to 25% of the dwelling units. For the impaired, the situation may not be comparable; for instance, they are younger, many work and drive cars with special controls, some could not use the economical form of public transportation, such as bus or street car.

The parking areas should be moderate sized and conveniently located to provide easy and safe access to entrances.

There should be no steps or curbs from the parking area to the dwelling buildings or to community space. Space should be planned to eliminate pedestrian circulation behind parked vehicles—a particularly hazardous area for the individual with limited mobility.

A desirable plan for multiple parking space would extend the parking surface into the sidewalk, eliminating the need for curbs. Surface drainage would place the sidewalk at the high point and the center of the parking driveway at the low point.

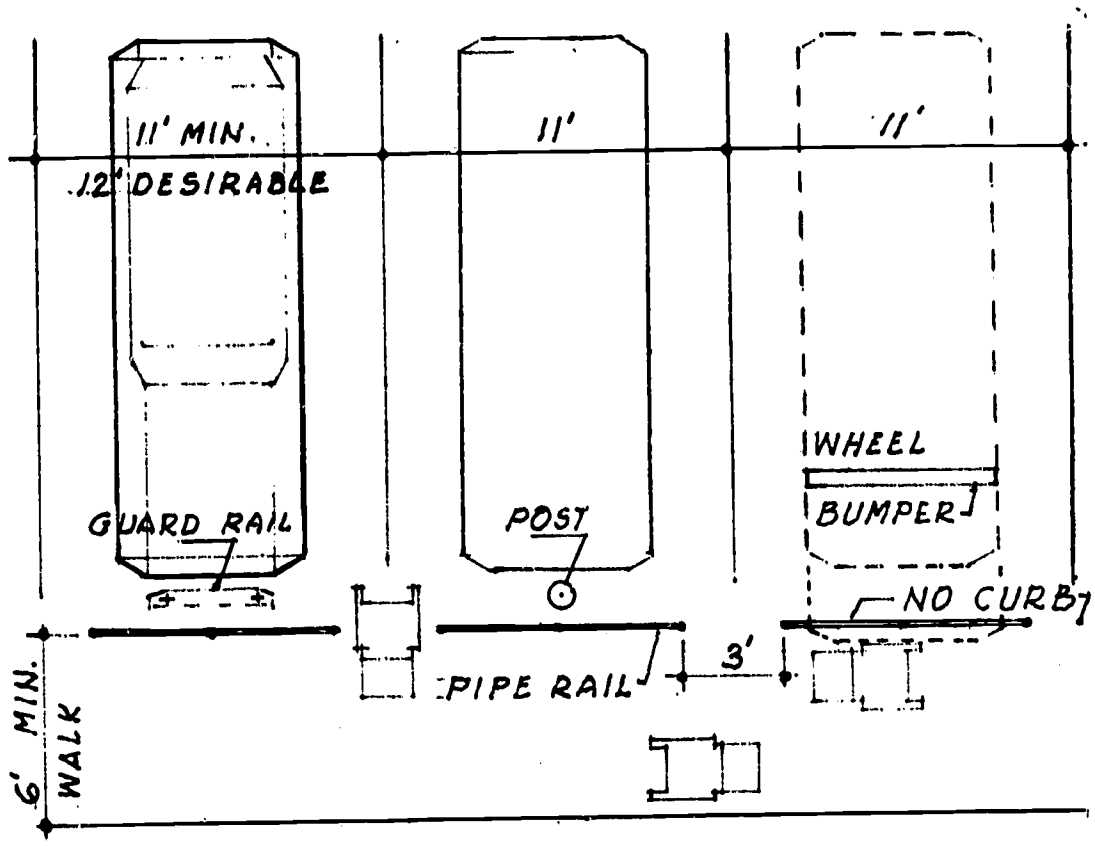


Figure 6. Parking. Wheel bumper not recommended as car overhangs vary.

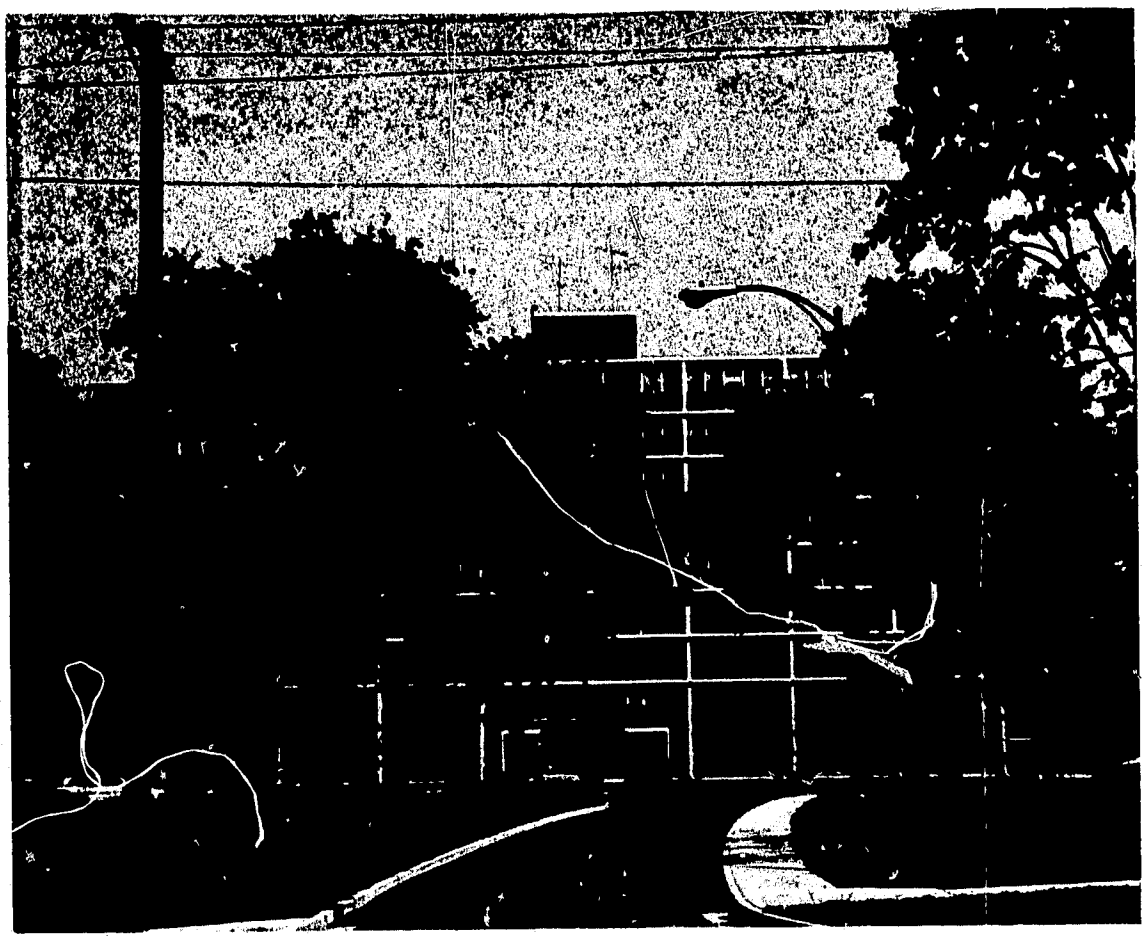
A pipe rail is necessary between the sidewalk and parked cars to protect people, particularly those with poor eyesight, from accidents caused by colliding with car bumpers.

For wheelchair users, the minimum width of parking bays is 11′ (12′ is desirable). Other orthopedic equipment users will require at least a 9′ width. The wider bays should be nearest the building entrances. For these tenants covered parking is desirable.

Parking bays for the nonimpaired may have a minimum width of 8′ under unusual restricted circumstances. However, the general rule should be 8′–6″. Parking areas should not be permitted to obstruct or dominate views from indoor recreation areas or dwellings.

Outdoor Areas, Lighting and Planting

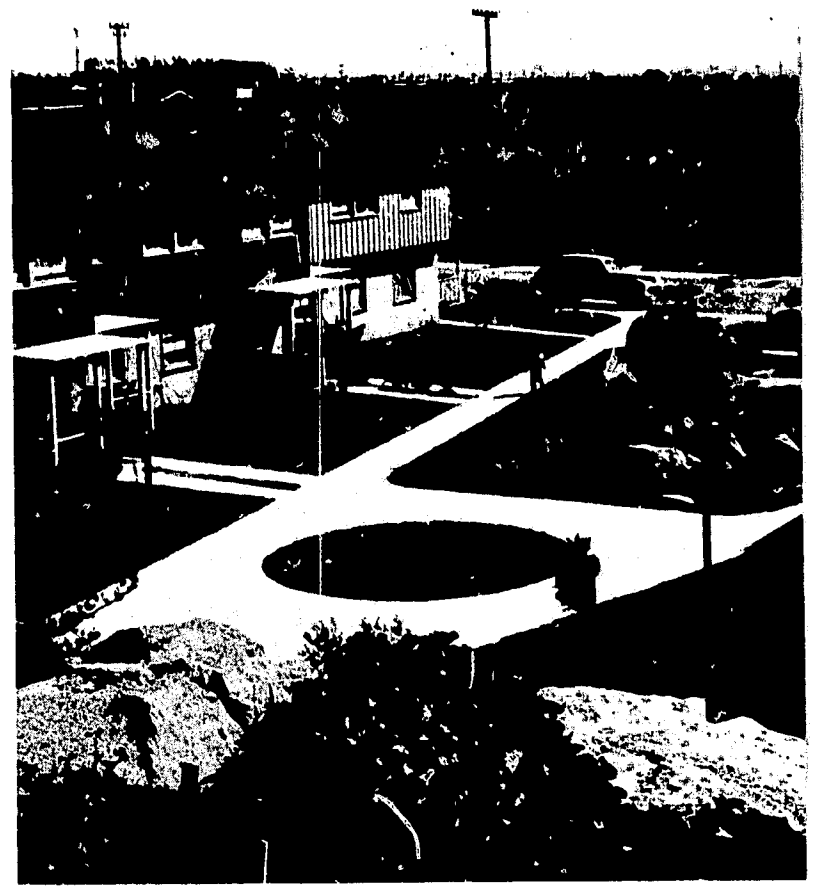
Outdoor facilities and areas (walks, ramps, drives, parking and recreational areas, etc.) should be sloped for drainage and be properly illuminated for safe circulation. Lights should be placed and angled to permit good perception from inside the building.



Lorain Metropolitan Housing Authority.

Bill Driver and Nashville Housing Authority.

Existing trees, stream or rock outcropping of the site, should be retained where possible in order to preserve natural beauty. Planting (a few large specimens skillfully located), with emphasis on recreational and sitting areas, contributes to enjoyment and creates a more pleasant environment. Planting around parking area will enhance the site.

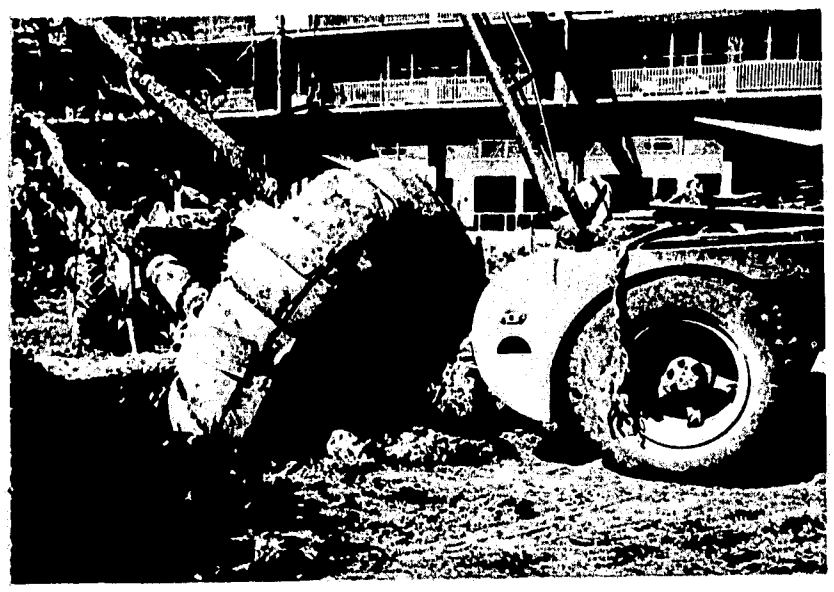


Housing Authority of the City of Richmond.

The surfaces of concentrated use areas should be paved for maximum safety, use and interest. For large paved areas, several materials of varied color, design, and texture are recommended to provide a pleasant visual diversity. Nonslip surfaces are desirable—rough surfaces generally present in field stone are not recommended.

Housing Authority of the City of San Antonio.

Rest or sitting areas should be protected from winter winds and excessive summer sun. Some of them should provide a view of the street or of other places where there is animated activity. The best way to provide shade is to use large trees or small attractive shelters, or both.



Housing Authority of the City of San Antonio.

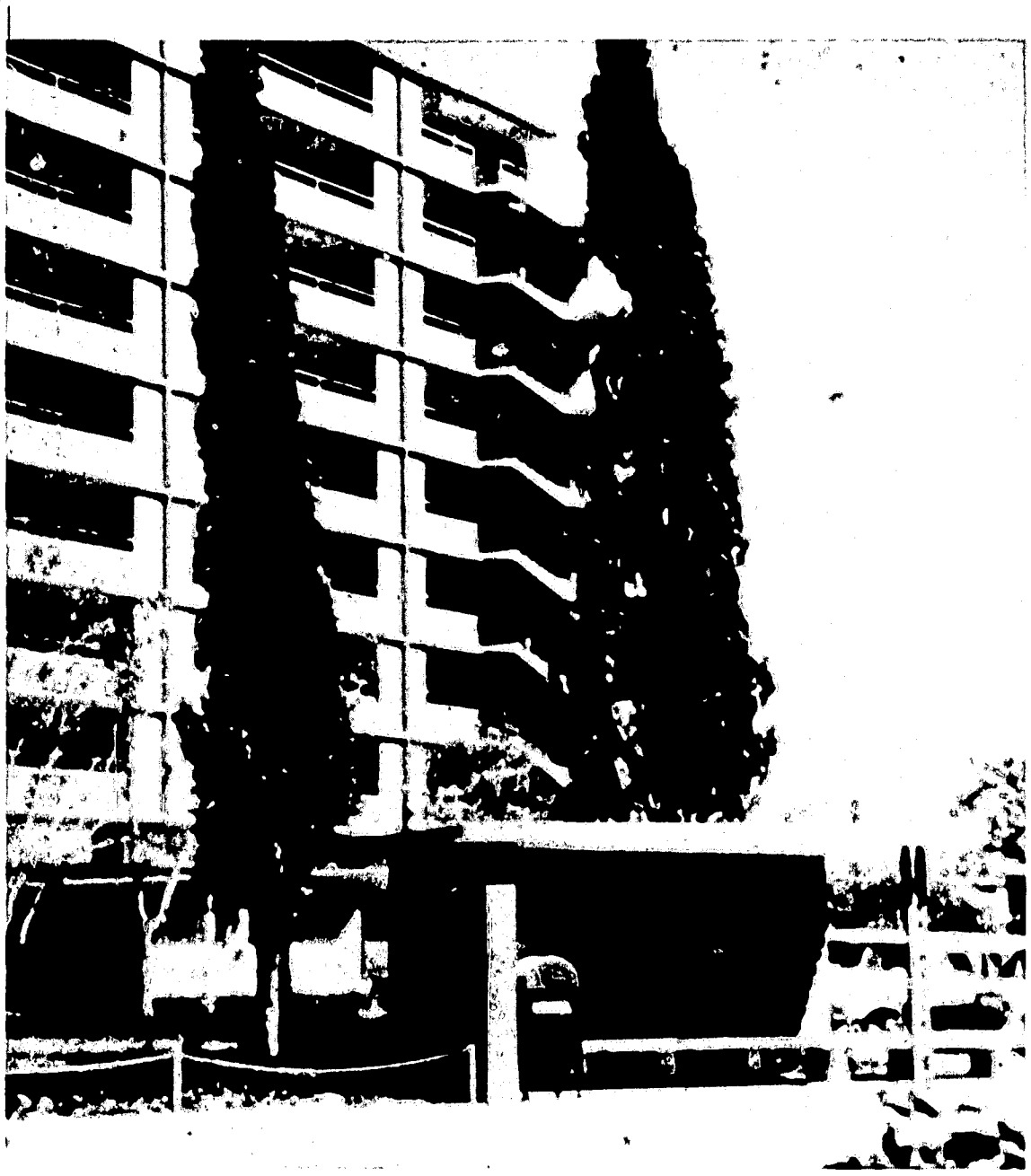
Flowering trees and shrubbery can enhance pleasantness and potential enjoyment of the setting.

One-story dwelling buildings and other structures, where appropriate, should have outdoor flower planting areas for the tenants, preferably at or near entrance door.

Clair J. Wilson and Housing Authority of the City of Milwaukee.

Every effort should be made to have a sheltered bus stop located at the development. (The cooperation of the local transit authority should be sought.) A mail depository box at the same location would be desirable.

Amenities such as a water fountain or a reflecting pool can be included if funds are available. Also, it may be possible to encourage donations of sculpture and other works of art from civic-minded local groups intrested in making this housing a visual asset to the residents and the entire community.



Housing Authority of the City of San Antonio.

Housing Authority of the City of San Antonio.

Future ease of grounds' maintenance should be kept in mind during the planning and design stage. However, achieving the best possible living environment is the primary objective.

Entrances

Entrance doors to multifamily structures, community centers and other public-use space, should provide a clear minimum width passage of 3′.[1] Entrance doors to individual dwellings should provide a clear minimum width passage of 2′–10″. Thresholds that project above the floor should be avoided (see figure 20), when possible. If a projection is unavoidable, it should be no higher than ½″, featheredged to the floor, and 5 to 6″ wide.

Hinged entrance doors to dwellings are the most economical and safest. Revolving door should *never* be installed; they must be collasped for wheelchair users and are particularly hazardous for users of other orthopedic equipment. For entrance doors to a multifamily building, it is best to have automatic door openers with floor mat activation, flush with floor. Such mechanisms should fully open the door without restricting the clear 3′ minimum passage. If the opening mechanism fails to function, the door operation should automatically revert to manual operation. Maintenance of the automatic door opener can usually be reduced by flanking the automatic doors with hinged doors for use of the physically unimpaired. Safety glass vision panels are recommended for solid panel building entrance doors. (See figure 7.)

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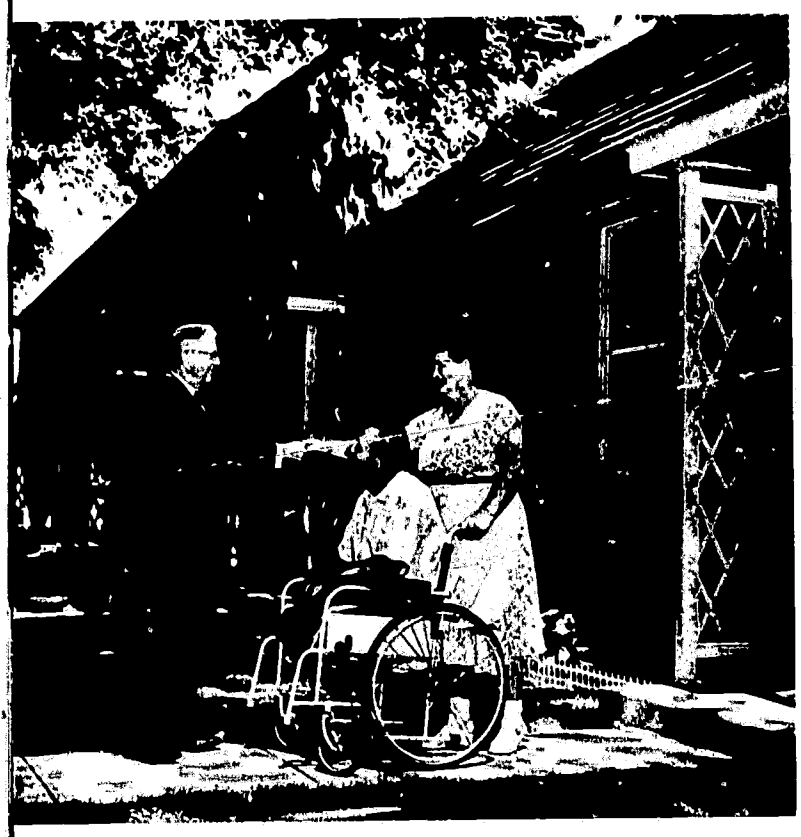
[1] *The two figures (3′, 2′–10″) have taken into consideration the door frame rabbit; therefore, the measurement for "clear passage" may be considered to be door frame width at door recess. Thus a hinged door 3′ wide satisfies the 2′–10″ clear passage since doors are usually not opened more than 90° when persons pass through.*

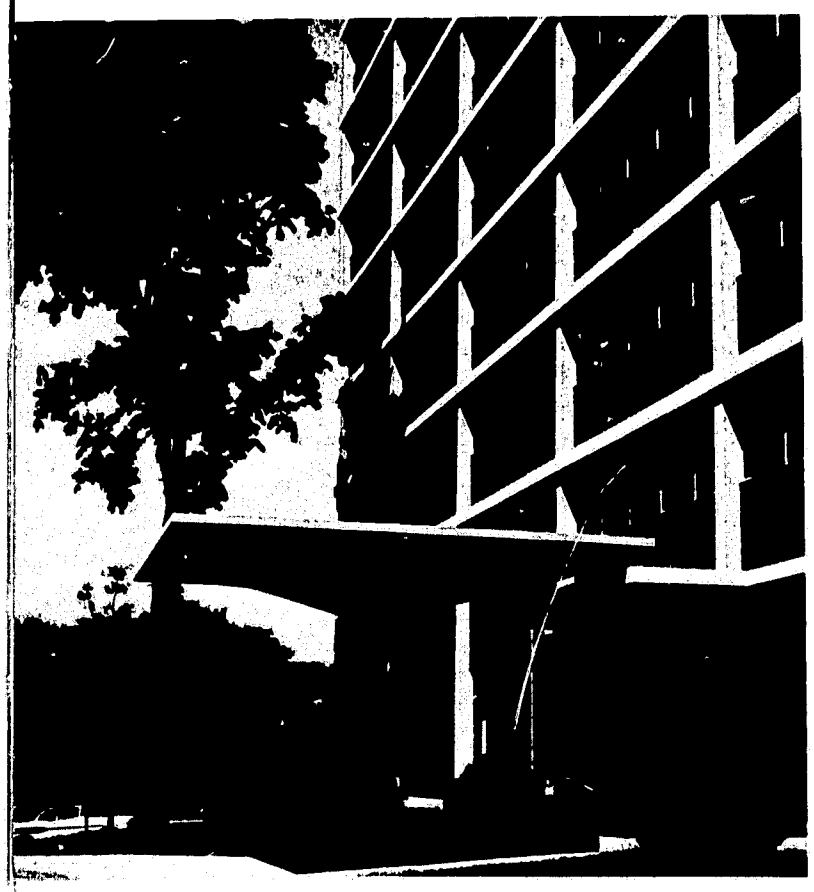
For those who have poor vision or are blind, the floor directly inside or outside of the entrance doors to multifamily buildings should either be slightly ramped or have a finish of a different color, distinguishable from the surrounding floor and a different texture that will provide more grip for shoe soles, thus notice of caution. Recessed floor mats meet these requirements.

Exterior doors should be covered by a canopy or hood of ample width.



(Clair J. Wilson and the Housing Authority of the City of Milwaukee.)

This entrance was not originally intended for a physically impaired person. The man in this photograph must be assisted to enter or exit the dwelling; a gentle ramp and platform at the top would give him a lot of independence.



(Bill Driver and Nashville Housing Authority.)

The canopy would be better if extended to or beyond the curb.

A porte-cochere may be feasible. A canopy or roofed-over service entrance also should be provided for ambulances if the development is for elderly and impaired persons. Other entrances may be made from parking areas and grounds. If a clinic is included, a separate entrance should be provided so that persons outside the project who come to the clinic will not use the main entrance lobby.

The operating hardware of entrance doors should be 2′–10″ to 3′ above the floor. Door checks or closers should be the adjustable tension type, set for minimum pull to assist persons using wheelchair and other orthopedic devices. Pull handles, push bars, and panic hardware bars with curved ends are best because they contain no hooks or sharp angles to catch

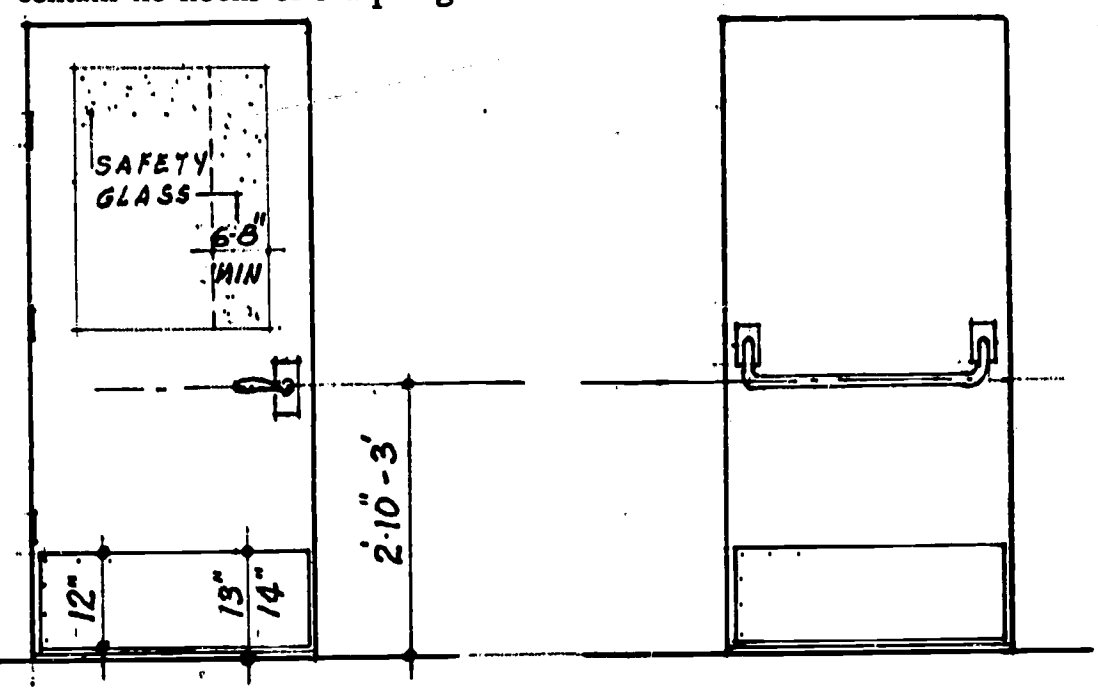


Figure 7. Building Entrance Doors and doors to public space should have vision panels.

clothing. A lever handle which curves close to the door surface is a most suitable operator for latch or lock. Round or oval door knobs, fluted, striated or knurled are not as satisfactory as lever handles. Kick plates 12″ high help to reduce door maintenance by preventing abrasions caused by footrests and axle hubs on wheelchairs, etc. (See photo pg. 36.) In multifamily buildings, entrance doors normally used by tenants should be provided with key locks which could be set to operate as latches (no keys needed) for daytime use and key used for nighttime. A tenant's key would operate these locks and his apartment door lock. Master keys should be provided for management use.

Public Corridors, Galleries

In mild climates, galleries might be appropriate and desirable for cross ventilation, tenant circulation, relaxation, visiting, etc. Galleries should be at least 7′ wide to allow enough room both for tenant sitting space and two-way traffic of persons using crutches or wheelchairs. Handrails of a bright color or material in bold contrast to the walls should be provided on corridor walls. Such handrails are especially helpful to people with poor vision and to blind persons.

To avoid hazards, doors should not swing into public corridors. Doors to public corridors should be identified by raised, brightly colored letters to aid the blind and those with poor vision. An important safety precaution is identification of doors not intended for normal use which would expose blind persons to danger if used. Such doors, when key locked, *may* provide sufficient protection.

No columns, radiators, drinking fountains, telephone booths, pipes or other projections should protrude into public corridors.

Public Stairs or Fire Towers

There should be no stairs or steps in the structure except those contained within fire towers for emergency use. Even such stairs should be especially planned. Single-run stairs between floors are not desirable; at least one landing should be used, two in floor-to-floor height over 9′. Straight runs between floors are not advisable; runs with 90° or 180° turns at landings are recommended. The most desirable stair would have a 6 to 6½″ riser and an 11″ minimum tread. The 11″ tread places the ball of the descender's foot inside the stair nosing. A safety nosing should be used which *does not project beyond the riser* [2] and which is distinct in color from the rest of the tread, preferably lighter. Risers should slope forward between 1 and 1½″ to permit the ascender's heel to rest safely on the tread.

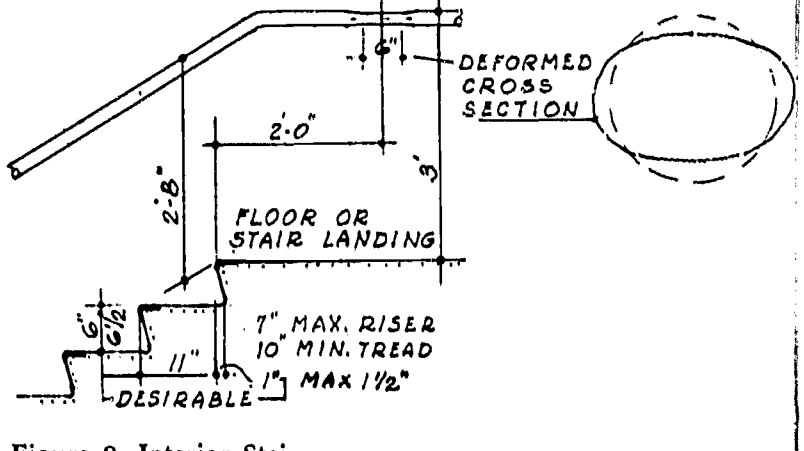


Figure 8. Interior Stair.

Stair wall handrails should continue around the platform to help anyone using the stair who is blind or has poor vision. The rails should carry a 6-lineal-inch marking for hand feel 2′ before the first down riser at both floor and landing levels. Steel pipes can be marked by deforming, or by a continuous raised welding, ground smooth, or by a smooth welded strip. Wooden rails can be shaved, notched, or marked with domed-end wood dowels.

Open or grating type fire escapes are not recommended.

Elevators[3]

It should not be necessary to go through the lobby to reach an ambulance. If there is no lower level entrance, the approach should be through a rear or side door in the elevator, thence to the service entrance to the ambulance.

Self-service elevators should level automatically at landings and have automatic sliding cab and hoistway doors with delayed closing, plus two push buttons both overriding the delay timing, one holding doors open, the other to close the doors. An emergency sound alarm system and a cab telephone for emergency use should be installed in each

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[2] *A projecting nosing is hazardous. Making Buildings and Facilities Accessible to, and Usable by, the Physically Handicapped. American Standards Association. October 31, 1961, page 9.*

Designing for the Disabled, a Manual of Technical Information. Selwyn Goldsmith, MA, ARIBA. London: Royal Institute of British Architects. 1963.

[3] *See HUD-HAA Guide Specifications Division 33 elevator details. HUD-HAA Elevator Equipment Bulletin No. LR–10, Part III.*

elevator. Cab handrails are required. Cab control panel should be set at a height convenient to persons in wheelchairs, the lowest buttons 3′ above the floor. The panel location should be on the side cab wall 1′ back from the front, otherwise a wheelchair will block most of the cab entry.

Back-lighted buttons with raised figures should be used to assist those with poor vision and the blind. These people will need some sounding device which would identify the next floor stop.

Since stairways are of no use to some, consideration should be given to emergency power to operate at least one elevator.

Incinerator Chutes[4]

Incinerator chute hopper doors should be lower than normal. A 2′ maximum height from floor to hinge is recommended.

Large hopper doors are desirable for convenience and maintenance. For the convenience of persons in wheelchairs, hopper doors should be installed in open corridor or alcove, a location found satisfactory for the elderly. Where codes prohibit this, a waiver should be requested. Anterooms are most inconvenient for many impaired persons—self-closing doors add complications for users of orthopedic equipment and wheelchairs.

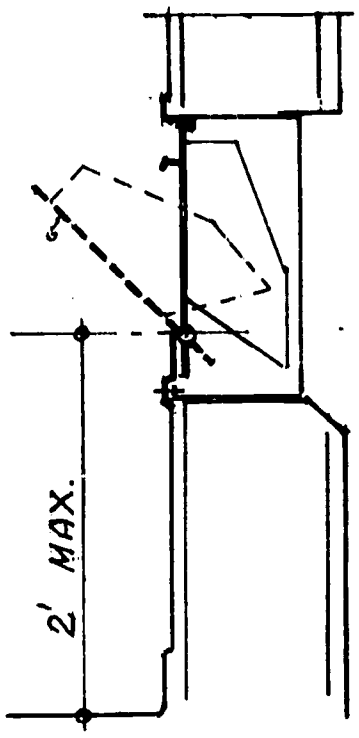

Figure 9. Incinerator Chute Hopper Doors.

Laundry Facilities

Laundry facilities should be either in one central area or grouped in several areas. Concessionaires who furnish and maintain coin-operated washing and drying machines generally favor, for their convenience, central laundry facilities. Conveniently located group laundries are usually preferred by the impaired and elderly tenants, and are recommended.

(University of Illinois, College of Agriculture.)
Bottom-hinged door not desirable.

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[4] *HUD-HAA Guide Specifications Division 5c, Incinerators.*

HUD-HAA Apartment House Incinerators Bulletin No. LR–7, Part XIX.

Apartment House Incinerators, National Academy of Sciences-National Research Council Publication 1280.

In some localities, the chute leads to a large steel portable container which is trucked away leaving an empty container in place.

(University of Illinois, College of Agriculture.)
Side-hinged door is recommended.

One automatic washing machine and batch dryer should be installed for each 20 one- and two-person families (one for 17 other families) or fraction thereof. In large central laundries, it is possible to use cabinet-type dryers which can handle more than one batch—useful in projects which include large families. In multi-family buildings, group laundries may be located on each floor or on some floors and not others, whichever is required to meet the demand. In cottage-type developments, laundry facilities should be located on the basis of walking distance, climate, and convenience.

Laundry rooms must accommodate the necessary equipment: work table, ironing board which is adjustable for standing or sitting, hanging rack, table and chairs for rest and sociability.

Tenant General Storage

In some housing developments for the elderly, central storage space has been found unnecessary. In others, space originally planned for this purpose has been converted to other uses. Central storage is not recommended for dwellings with one- and two-person occupancy —the general storage provided within the dwellings will suffice.

Mail Boxes

In cottage-type developments, where mail is delivered to the individual dwelling unit, a mail receptacle must be provided. The best type is the mail slot with a receiving box inside, the top of which is 2′–10″ to 3′ above the floor. Impaired persons should not be expected to pick up mail from the floor. A mail box mounted outside is not desirable. Mail slots should not be located in entrance doors where locked screen doors may make them inaccessible to the mailman or the inside box would interfere with door opening at least 90°.

Mail boxes in a multistory structure are usually installed in rows stacked above each other. Sometimes, because of limited wall space the top rows are beyond the reach of wheelchair users; for them the locks to their boxes should not exceed 4′–3″ above the floor. The local Post Office should be consulted when planning this feature.

Separate mail boxes for community space staff workers are desirable, especially when the Management Office where they would otherwise receive their business mail, is located at some distance from the community space.

Housing Authority of the City of San Antonio.

Dwelling Units

General

The major problems in designing most "rental housing" for the physically impaired are how to provide maximum livability and safety for persons with impairments that vary in nature and degree. These problems are somewhat mitigated when the housing is to be designed to aid a specific type of impaired individual, such as the blind or the cardiac. The recommendations that follow, however, are based on the fact that the units will be occupied by people who have varying types of impairment, such as: those with poor vision, or blind, who may or may not use a guide dog; those using wheelchairs or crutches; and those whose physical condition requires the conservation of energy though they use no orthopedic devices.

For room divisions of the dwelling plan, either fixed or movable partitions are suitable. Divisions may be achieved by movable wood closets that do not reach the ceiling, or by fixed or movable baffle walls, which are particularly suitable in warm climates. A desirable feeling of larger space is created when the ceilings of adjoining rooms visibly flow from one to another.

Housing Authority of the City of San Antonio.

All bathrooms should be enclosed by floor-to-ceiling partitions.

Kitchens may be baffled or shielded. When the open plan is used, the kitchen should be fan-ventilated. View of kitchen equipment from the living room, and entrance to the dwelling through the kitchen, should be avoided.

Each unit should have sufficient space to assure suitable living, sleeping, cooking, and dining accommodations, plus adequate storage and sanitary facilities.[1] The space should be planned to permit placement of furniture and essential equipment for circulation by wheelchair users and those on crutches.

Living Room

In general, dwelling entrance should be by way of the living room. Entrance through the kitchen is not desirable. For families without children, a combined living-dining room arrangement is preferable to a kitchen-dining room combination. A wheelchair requires at least 2′–6″ seating space at the dining table. Dining by a window, the stool of which is no higher than the dining table, is pleasant, and particularly desirable for the elderly or impaired persons.

1 *For acceptable maximum dwelling unit space established for low-rent housing, see HUD-HAA Low-Rent Housing Manual Sections 207.1 and 207.7.*

Housing Authority of the City of San Antonio.

Figure 10. Kitchen Sink and Base Cabinet Elevation and Section.

Food service from the kitchen to the living-dining area should be direct, without turning corners, and the distance as short as possible. A partition between the living room and kitchen should be provided. A baffle wall, with posts attached to floor and ceiling, the material between the posts not reaching either the floor or ceiling, makes a quite suitable partition and creates a sense of space. Prefabricated wood closets resting on the floor and not quite reaching the ceiling also make suitable living room-bedroom partitions in dwellings for one and perhaps two persons. In these small dwellings, the resulting open plan makes the space look larger than it is.

Kitchen[2]

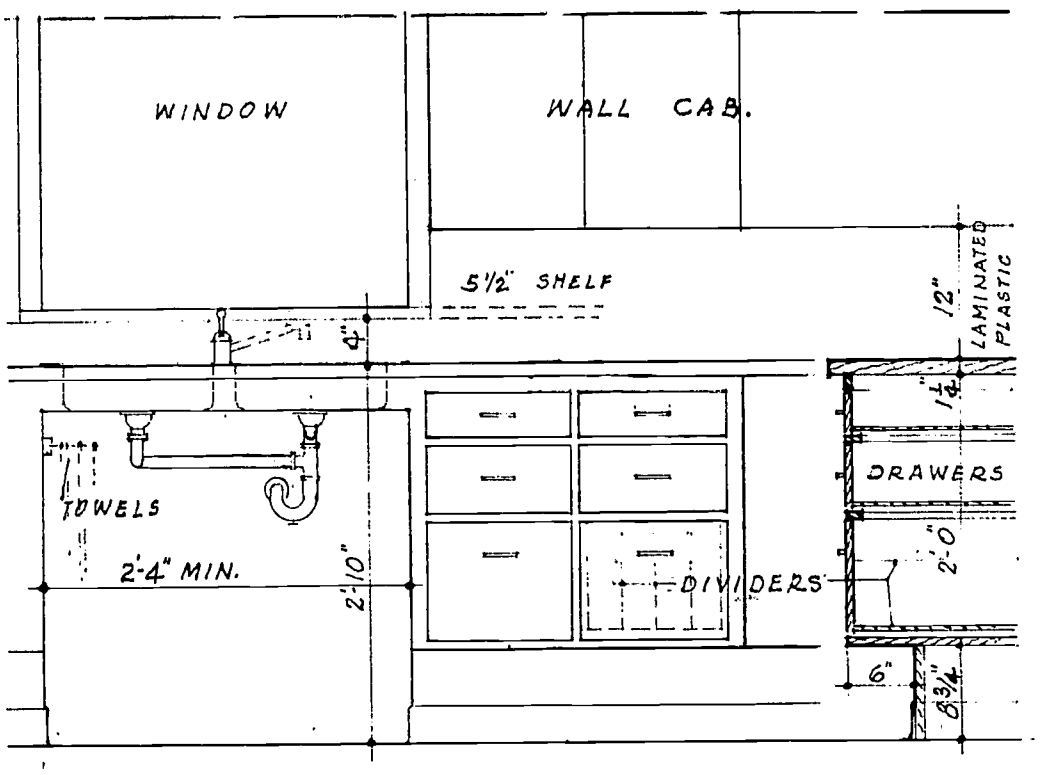
The kitchen for the physically impaired requires more considered attention than any other room. Unlike the living room, the kitchen may require more space than one for the non-impaired. It is possible to design, plan and build a kitchen to be operated by a disabled person using crutches or a wheelchair, which is also servicable for the ambulatory impaired or the nonimpaired person.

A 5′ minimum width should be provided for wheelchair turns between counters on opposite walls or between counter and opposite wall.

Counter tops should be set 2′–10″ above the floor, a workable height from both wheelchair and standing positions.

2 *Kitchens for Women in Wheelchairs, University of Illinois, College of Agriculture Circular 841.*

Work Simplification in Child Care, University of Connecticut, School of Home Economics.



Base cabinets should have a recessed toe space 6″ deep and 8¾″ high to allow the wheelchair homemaker to get close to the counter and to permit maneuverability. A minimum open space 2′–4″ wide should be provided under the sink. Base cabinet storage space involving hinged doors and fixed or adjustable shelves *should not* be used, because many impaired persons cannot bend down enough to use them. Base cabinet storage is most usable when drawers of various depth are provided and revolving units are installed at the reentrant corners. Pull-out vertical units at one or both sides of the work center also are desirable.

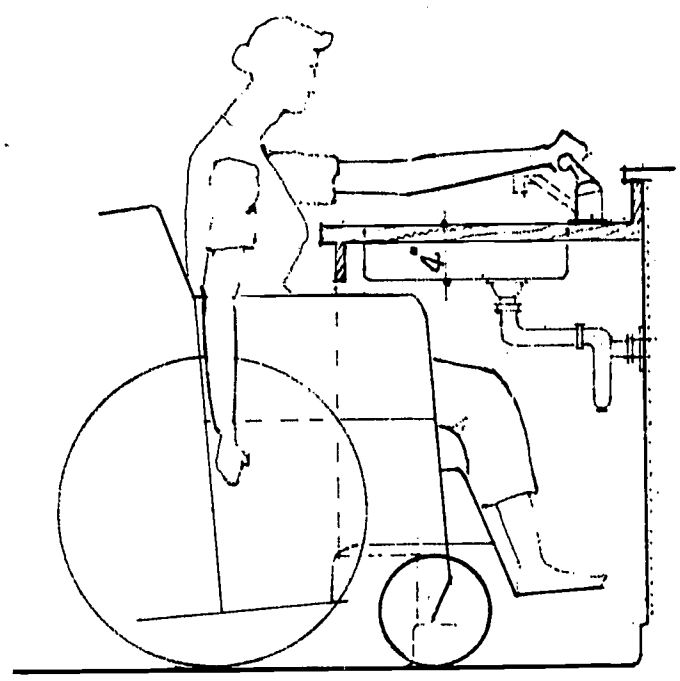


Figure 11. Kitchen Sink Section with trap set near back wall.

The kitchen sink should be 4″ deep, single compartment for 1- or 2- person dwelling, and single or double compartment for larger dwellings. The drain should be at the rear of the sink to provide maximum clearance for knees and clearance under the sink for standard wheelchair arms, 29″ above floor.

(University of Illinois, College of Agriculture.)
Counter height at 36″ is too high—undersink closed front not desirable.

At this height, the wheelchair homemaker can reach the inside bottom of the sink without undue stress. This height is also suitable for the stand-up user without unnecessary bending.

(University of Illinois, College of Agriculture.)
Sink counter at 30 to 32″ is satisfactory for wheelchair user but too low for the stand-up worker.

When a stainless steel sink is used, undercoating should be applied to prevent condensation, which also acts as insulation. A single lever handle water control mixing faucet should be provided. This type is the easiest to operate for those with hand infirmities. The swing spout should have a built-in aerator to prevent splash, especially in a shallow sink. The sink waste line should have a close fitting elbow leading to the trap installed near, and parallel to, the back wall. (See photo pg. 29.)

Sustained contact with the underside of a sink or trap filled with hot water could burn persons in a sitting position who lack leg or knee sensation. An insulating board under the sink is not a solution, because the hot water at the faucet and in the sink may be between 130 to 140°F. which is a hazard to a person lacking hand sensation. A much safer way is to control all delivered hot water at a maximum of 120°F. Recent tests[3] showed that 120°F. water at the faucet, the water in the undercoated stainless steel sink was 112°F. and a safe 95 to 100°F. on the sink's undercoating. The maximum hot water temperature control should be under management supervision only, which may be the control recommended in the bathroom.

One arrangement for the work center would have a knee-hole opening, 2′ wide minimum (2′–4″ is desirable), flanked with vertical pull-out units about 12″ wide. The vertical units[4] should extend from under the counter to toe space, with content accessible from the knee-hole side when the units are pulled out. One flanker unit could be used for hanging utensils from a peg board.

The other, if installed, could be used for supplies and should have adjustable shelves.[5] Space for the storage of additional supplies should be provided on the counter or in wall cabinets directly in front of the work center.

[3] *Tests by the Architectural Adviser.*

[4] *Easy-glide metal track with ball-bearing rollers is necessary.*

[5] *Wherever adjustable shelves are mentioned in this Guide, a metal track is recommended, punched for 1/2″ vertical adjustment of shelf supports, which are bent 90° (not 45°) thus no interference with stored items.*

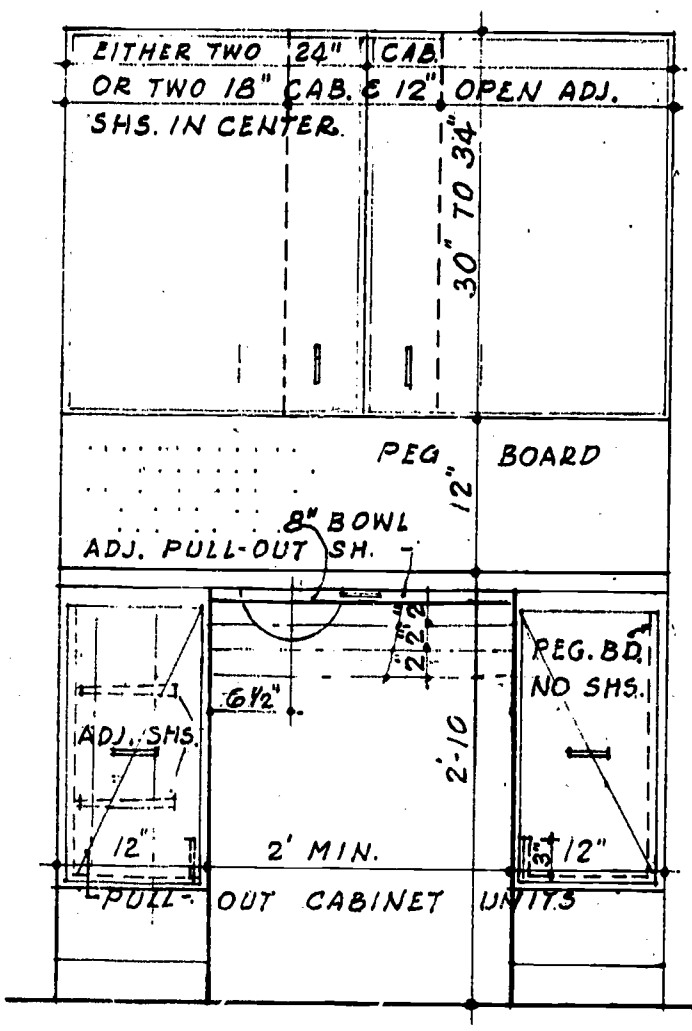


Figure 12. Work Center Elevation.

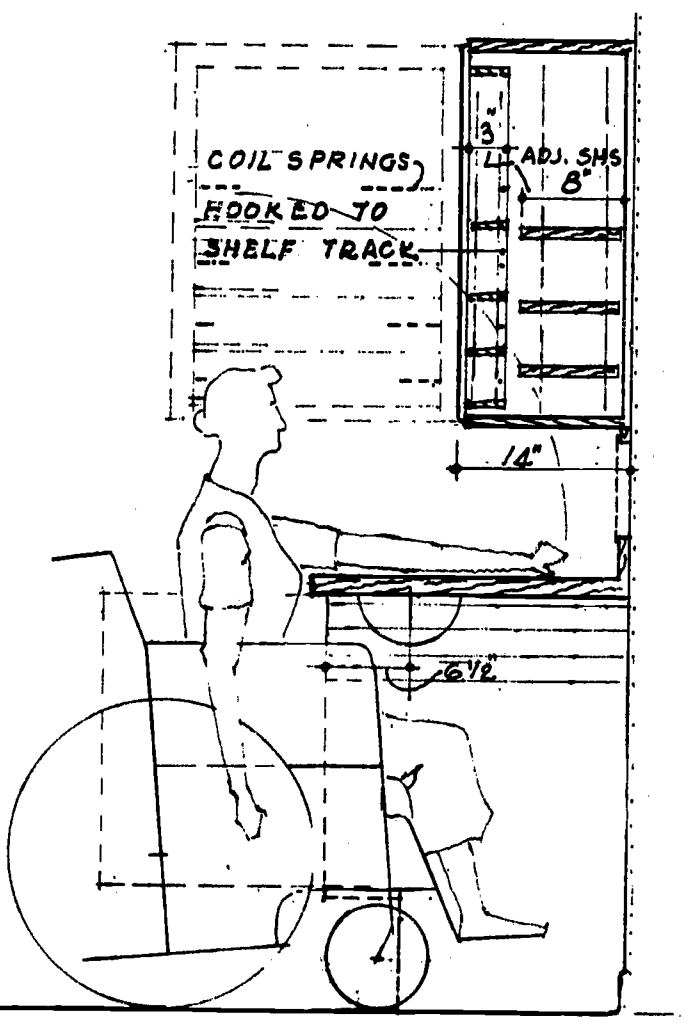


Figure 13. Work Center Section. Rear track set 1/4″ lower will cause shelf to slope. Recommended.

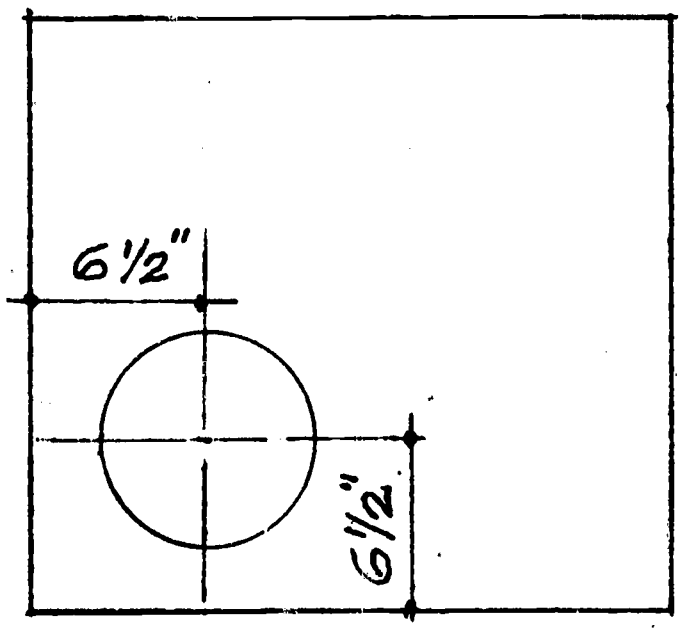
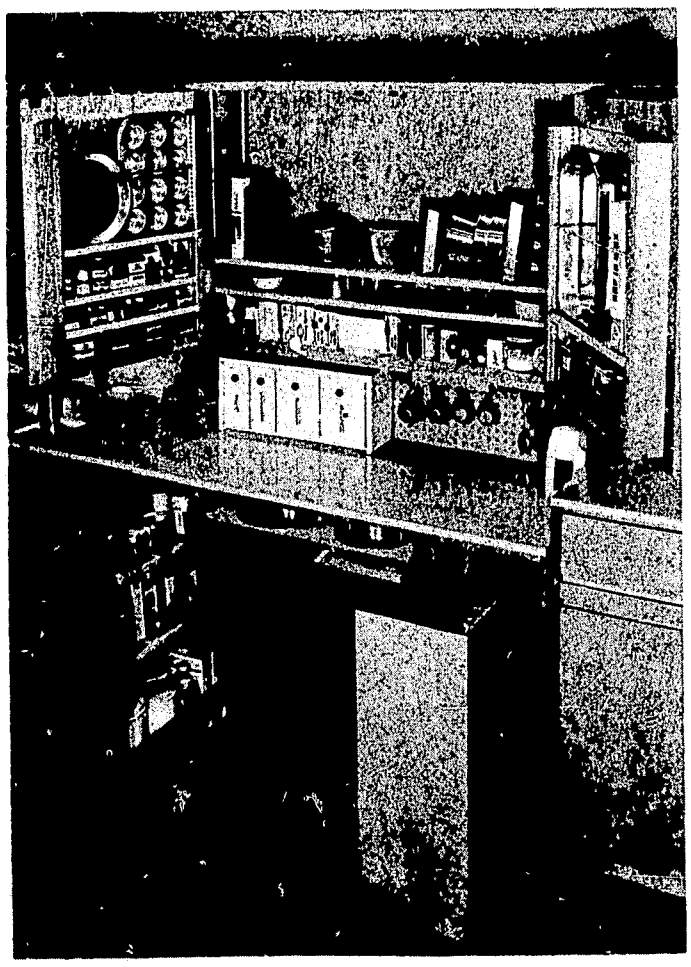


Figure 14. Pull-out Shelf Lapboard. A plastic laminated work surface is recommended. The hole is for an 8" diameter stainless steel mixing bowl which should fit snugly when the top rim is about one inch above the shelf.

Another work center arrangement would be the right-hand pedestal 16 to 18" wide with drawers, no left pedestal; it is desirable to increase the open space to 28 or 30", the storage cabinet above the counter may be open adjustable shelves.



University of Illinois, College of Agriculture.

A lapboard pull-out shelf beneath the counter at the work center should be installed to provide a working surface for mixing and cutting operations. This shelf should be adjustable in height at 2" intervals from about 2'–2" above the floor to the under-counter position. The hardwood shelf should be cored to brace firmly an 8" diameter mixing bowl.

Under-counter or wall-storage space should be provided, if possible, for a small (perhaps 18"x24") tenant-owned wheel table. Such tables are useful for moving several items at one time from the refrigerator to the work center, to the dining table, etc.

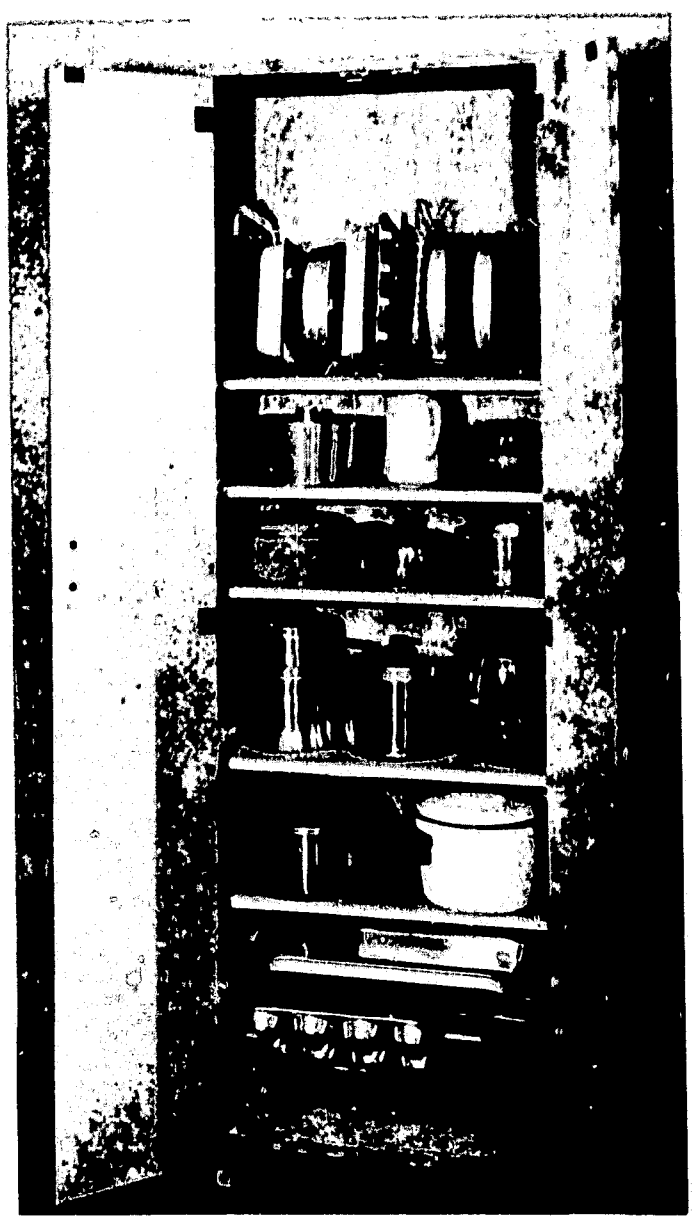
Wall storage cabinets, when mounted 12" above the counter, provide the maximum convenient storage, accessible from a sitting position. The average height (5'–4½") female's reach from floor to wrist is: 6'–0" standing; 4'–10" sitting in wheelchair, side reach; 4'–7" sitting in wheelchair under kitchen counter to front of wall cabinet. Standard wall cabinets, 14" deep and 30 to 34" high with 3 adjustable shelves, are recommended. The upper shelf of such cabinets is reachable by taller, nonimpaired family members. To reach lightweight food packages on upper shelves, some wheelchair homemakers use "reaching tongs," which are inexpensive and easily obtained. Cabinet doors should be equipped with 3 to 4" drawer-type pulls of simple design and magnetic or nylon roller latches, which are the easiest type to operate. At the work counter, 3" adjustable shelves should be installed inside of the cabinet doors to provide convenient storage for numerous small items. (See Figure 13; and photo this pg.)

A 5½"-wide open shelf placed 7" below the wall cabinets may be desirable at some location.

Cabinets should never be installed above counter-top burners or ovens. Such placement creates a fire hazard to the person reaching for stored articles, because his clothing might ignite or he might accidentally drop the articles into boiling water or hot grease.

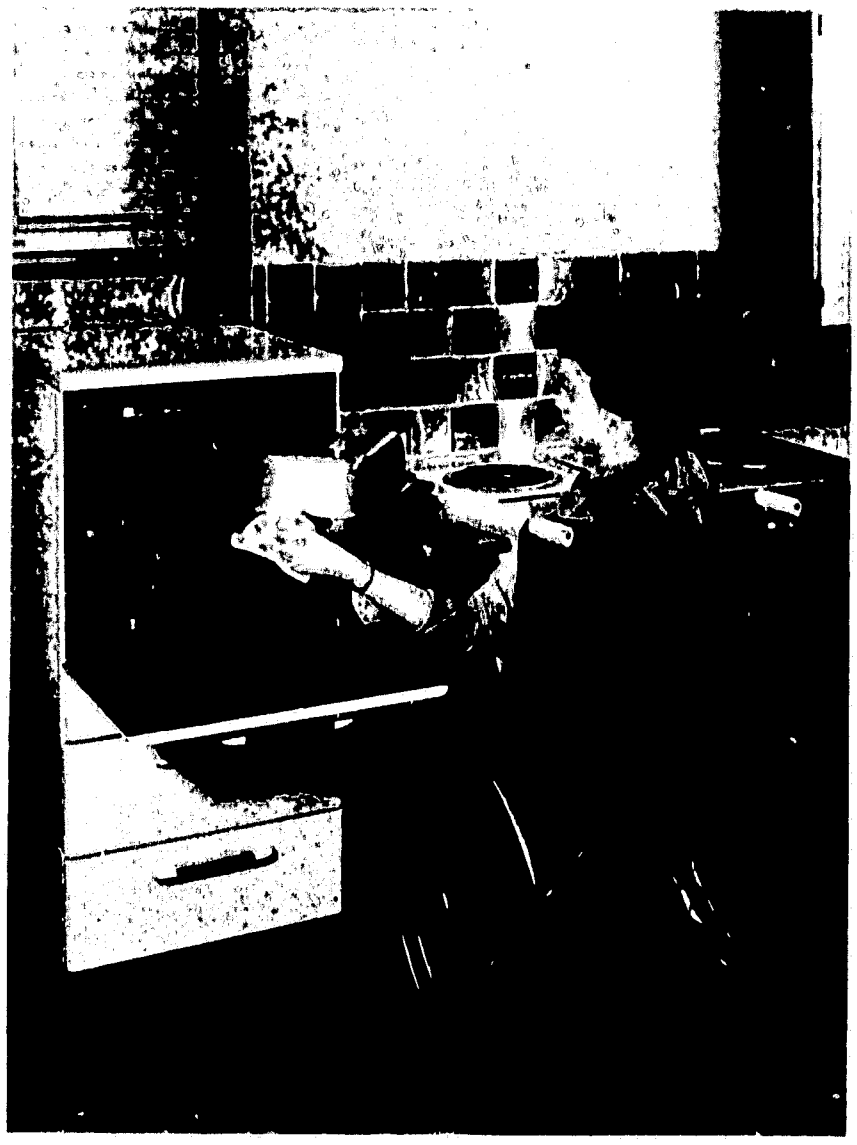
A 14" deep, 18 to 24" wide cabinet, resting on floor, extending to the same height as the top wall cabinets is also very useful as storage space for the wheelchair user and others. A standard 14" deep cabinet with adjustable

$9\frac{1}{2}$" shelves and shallow inside-of-door adjustable shelves places within reach from a standing or sitting position many cooking utensils, dishes and packaged food supplies. The door hinges for such a cabinet should be the continuous piano type. The cabinet bottom can be used for storing serving trays, cookie sheets, muffin pans, etc., when the usual dividers are installed slanting either horizontally or vertically, thus increasing the cabinet's depth and usefulness.



(University of Illinois, College of Agriculture.)
Note the variety of stored items possible when shelves are adjustable.

The standard range, with oven below and bottom-hinged door, is unsatisfactory and hazardous for the physically impaired person. Counter-top burners should be provided, preferably with front-of-counter controls. Controls mounted back of the burners are not recommended because of the hazardous reach involved, and controls mounted on the counter to the side of the burners may interfere with the transfer of pots from burners to counter. Easy-to-read large control dials, with safety feature to prevent accidental turn-on of burners, should be provided. To assist the blind and those with poor vision, the control dials, in addition to visual markings, should be marked, shaped or provided with click stops so that the fingers can feel such marks, shapes or clicks representing the various heat intensities at the burner. Push-button control with indicator light for electrical burners is satisfactory. Burners should not be located below or near a window or near a door. A separate oven, with a left or right side-hinged door depending on counter top space and front controls, should be installed so that the height of the pull-out oven shelf at the lowest position is at counter-top level. This permits transfer of hot pans from oven to counter conveniently and safely. Ovens with glide-up doors are also satisfactory.



(University of Illinois, College of Agriculture)

Note bottom-hinged oven door and arm of the wheelchair person. An arm burn is possible plus dropping the roaster and its hot contents.

Electrical top burners are considered by some as safer than gas burners, because the gas flame can more easily ignite loose, flimsy garments. However, electrical units are not completely safe. When the control of an electrical burner is at "high" a warning glow appears, but at "low" there is no burner glow to indicate danger. Further, immediately after the control is turned off from high, the glow disappears but the element is still very hot. A very desirable feature is a warning red bullseye that turns on and off by the control for the top burner. Electrical top burners and ovens are generally recommended.

Where gas top burners and ovens are used, it would be desirable for safety reasons if industry could supply the burners with 100% automatic cut-off in case of pilot failure. This is featured on domestic water heaters and some ranges.

The recommended type of refrigerator-freezer is the standard two-compartment, two-door model with freezer compartment on top and self-defrosting for the food compartment only. Pull-out shelves in the food compartment are desirable. The freezer compartment would be defrosted manually every few months. Frequent defrosting of the food compartment is a difficult operation for many impaired persons.

While this chore could be done by a non-impaired family member, if one exists, this does not solve the problem for the impaired single tenant. There is increased cost, directly reflected in the lowest achievable monthly rental, in electrical consumption of a self-defrosting unit. The increase varies, depending on refrigerator and family size, climate, electrical rate and other variables.[6] The cost of the

[6] *HUD-HAA Test of Automatic Defrosting Refrigerators. April 1966.*

recommended refrigerator is about $35 more than the manual defrost unit with freezer compartment and single door; however, no increased maintenance cost should result. The refrigerator location in the kitchen should never be adjacent to heat-producing equipment such as the oven, top burner or water heater.

Garbage grinders,[7] the continuous-feed type of grinder is more convenient to use, costs less to maintain, than the batch type and is recommended.

Dishwashers are admittedly desirable, especially those with electric heater booster; however, because of their high maintenance cost and the effect this cost would have on the rentals charged low-income tenants, dishwashers are not provided in low-rent housing.

Whenever possible, natural light and ventilation in kitchens should be provided through windows. Artificial light should be distributed to illuminate all dining and cooking areas effectively. Any required mechanical ventilation should be adequate for removing cooking fumes and odors, as well as for summer comfort.

Bedroom

All bedrooms should be partition-enclosed. In one- and perhaps two- person dwelling, one wall may be movable wood closets, a baffle wall, or a sliding or folding partition. Sleeping-living room combinations are *not* recommended, nor are room layouts which require the bed to be in a corner or the side of the bed to be against a wall. Such arrangements add to the difficulty of bedmaking.

For two or more persons, at least one bedroom should be planned for twin beds. Bedrooms intended for the impaired will require more floor area than other bedrooms, to provide for wheelchair circulation. At least 3′ (preferably 3′–4″) must be provided for wheelchair along one side of one bed, in front of clothes closets and furniture.

[7] *Permitted by HUD-HAA only where required by local codes.*

Bathroom

The bathroom presents more hazards than any other room, therefore, planning for safety is of utmost importance. A bathroom must be larger than standard to permit wheelchair use. The minimal floor area of a carefully planned bathroom is 40 to 45 sq.ft. A bathroom that permits a wheelchair to enter but not to turn around is not desirable. For maneuverability, an area 45 to 55 sq.ft. is recommended; however, careful planning is more important than increased floor area.

Grab bars capable of supporting 250 pounds should be provided at the water closet, shower, and elsewhere in the bathroom. Grab bars should be devoid of sharp corners, with ends return to the walls. Towel bars should be of grab bar quality and strength for safety because they may accidentally be used as grab bars.

Bathtub or shower? We are not considering a hospital, or a nursing home, but a dwelling for independent living and self care. The occupants may be physically impaired, single or married, young or elderly. The question therefore is: what will provide a bathing facility which can be used by the most people, over the longest period of time, with the least hazard? The answer is a specially designed shower with these features:

- No curb or step, for ease of access, including wheelchair.
- Internal dimensions of at least 3′–4″x 4′–6″.
- Unglazed tile floor[8]—the same for the bathroom floor—which drains into shower.
- 4′–6″-wide opening with sliding nonbreakable doors (not hazardous curtains).

[8] *See Floors pp. 36–37 for more detail on floors.*

• 120°F. maximum temperature delivered hot water under management control; this control would also supply the lavatory and kitchen sink—tenant control for lower temperatures.

• Single lever mixing handle set 3′–6″ above floor, located inside shower compartment, but reachable from outside shower.

• Possibly a flexible metal-covered extension spray head with or without holders at different levels, recommended to be detached for use as hand spray.

• The suggested toilet chair may be used in the shower.

• A recessed soap dish—convenient from sitting or standing position.

• Grab bars.

Curtis P. Artz, M.D., F.A.C.S.,[9] has this to say about hot water: ". . . temperatures of water when used in the treatment of the physically handicapped.

"Whenever the total body is immersed such as in a bathtub or a Hubbard tank, the temperature is kept at 100 degrees Fahrenheit plus or minus three degrees.

"Whenever only one part of the body such as the arm or leg is immersed, such as in a whirlpool bath, temperatures are kept between 100 and 105 degrees.

"Whenever the entire body is treated for a short period by running water such as in a shower, the temperatures may be a little higher —usually 105 to 110 degrees Fahrenheit.

"I would assume the controls should be fixed so the water temperature could be kept near the above figures.

"Patients who are physically handicapped and especially patients who have been burned do not tolerate temperatures as high as normal individuals."

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[9] *Curtis P. Artz, M.D., in a letter of October 24, 1966, to the Architectural Adviser. Dr. Artz is Chairman, Department of Surgery, Medical College of South Carolina—also on Committee on Trauma and Burns, American College of Surgeons.*

The lavatory should be set 2′–10″ above the floor:

• The maximum depth, 4″.

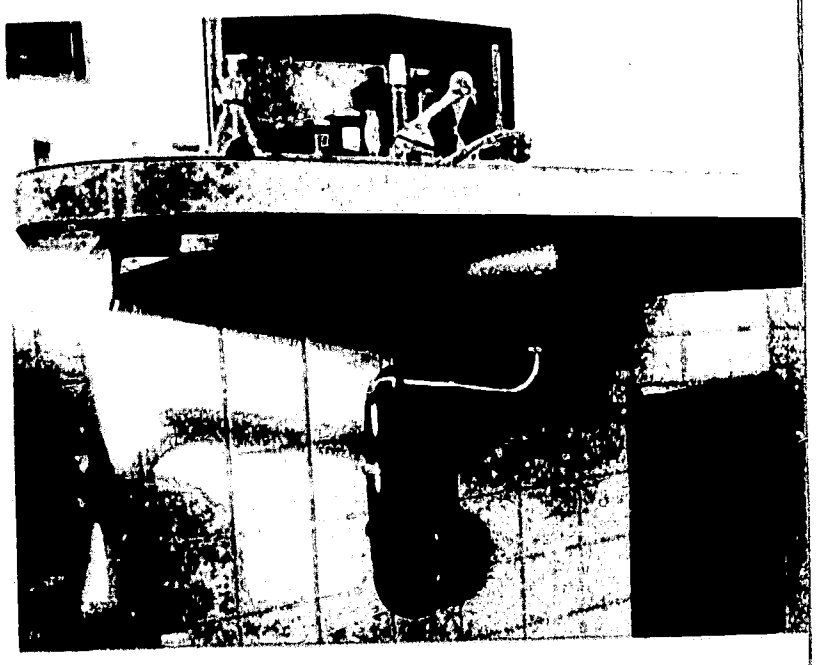
• Single lever water control—aerator spout.

• 120°F. maximum temperature hot water under management control—see shower control.

• Drain opening at the rear of the bowl.

• A close elbow drain, run to the trap, set near and parallel to the wall—so as not to interfere with knee room.

Lavatory mounted with control on left—can be turned for controls at rear or right side.
By Architectural Adviser.



Underside of lavatory piping arrangement.
By Architectural Adviser.

A square lavatory can be installed in a counter top with the faucet at the rear (normal position) or the lavatory turned so that the faucet is either to the right or left side. A side arrangement facilitates use by a tenant with limited reach and can easily be converted for convenience of future tenants, when initially provided with flexible tube water supplies and ample length slip joint tail piece waste line.

The mirror over the lavatory should be useable from both standing and sitting positions. If fixed to the wall, the mirror should be tilted forward at the top. Bottom-hinged mirror provided with a friction stay arm is available. This mirror permits the top to tilt forward to any distance up to 6″, and can be installed on the medicine cabinet door.

The medicine cabinet should be mounted so as to be accessible from standing or sitting position, and its location in the bathroom should be carefully considered.

The water closet seat of standard height, 15 to 16″, can be used by ambulant impaired persons. For the semiambulant and others who find this height difficult, a standard manufactured sanitary chair with arm rests and seat 18″ high is recommended. The advantage of the chair is twofold; it can also be used in the shower, and would not be present when not needed by the occupant. Some wheelchairs are equipped to be used as toilet chairs. Grab rails should be provided at the closet. One manufacturer can supply an integral seat, cover and grab bars. (Note: Detachable ring seats that clip on the china bowl or seat are unstable and should be avoided.)

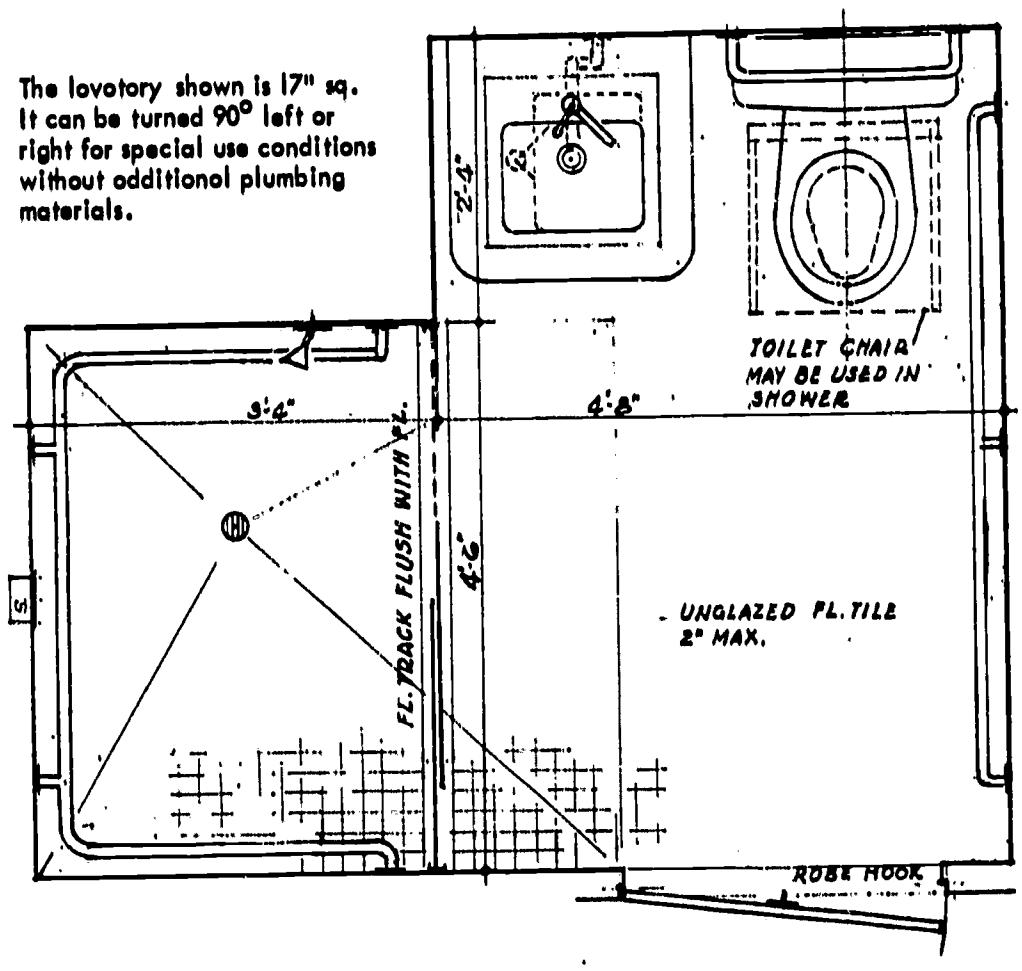


Figure 15. Bathroom Floor Plan.

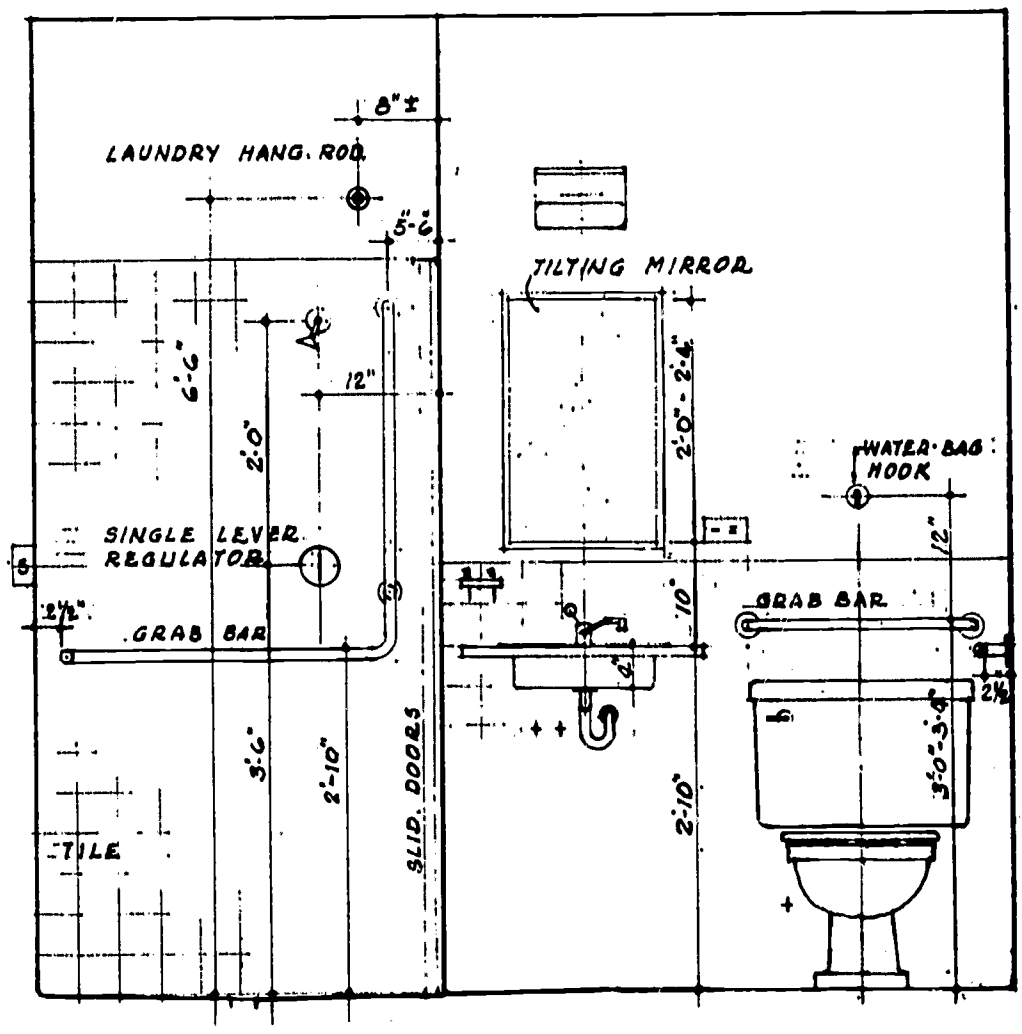


Figure 16. Bathroom-Shower Elevation. A grab bar above the toilet assists person making a frontal approach. Shower regulator with temperature control is recommended.

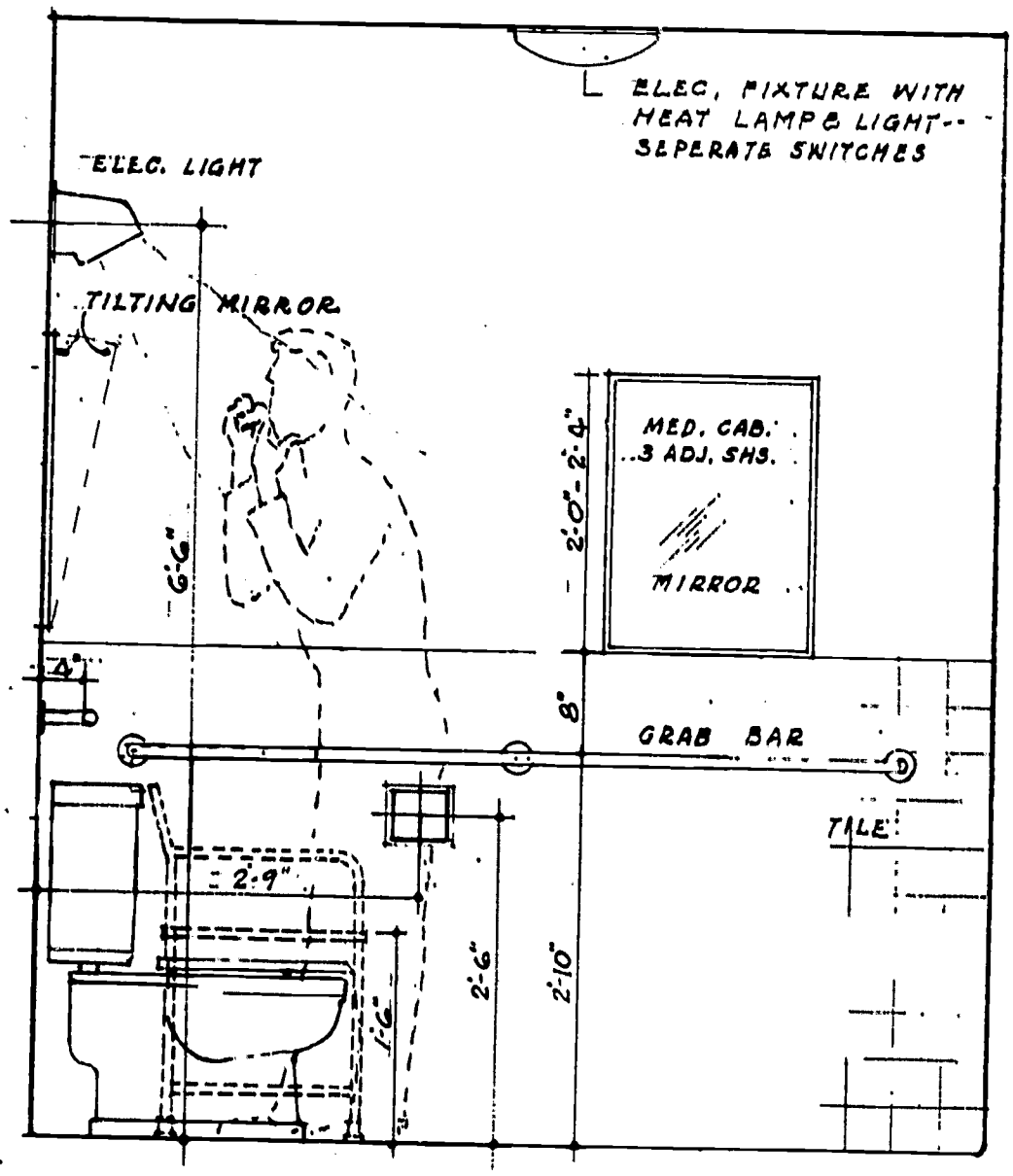


Figure 17. Bathroom Elevation. The standard sanitary toilet chair with seat 18″ above floor is an aid to impaired persons who have difficulty using the normal toilet.

Toilet chair with wheels—two wheels with brakes. The chair is available without wheels—same seat height—rubber-tipped legs.

By Architectural Adviser.

Storage

Adequate storage space should be provided within the dwelling. *Separate* units are desirable for hanging coats, for bedroom, linen and general storage. The storage units may be closets enclosed by partitions, or wood cabinets, fixed or movable, to serve as room dividers. Kitchen cabinets are discussed elsewhere.

The coat closet should permit the hanging of clothing from both standing and sitting positions. For the standing position, the fixed shelf height at 5′–6″ with the clothes-hanging pole below is standard. For the wheel chair position, 4′ to 4′–6″ is most convenient. The lower shelf and pole unit should be adjustable from 4′ to 5′–6″.

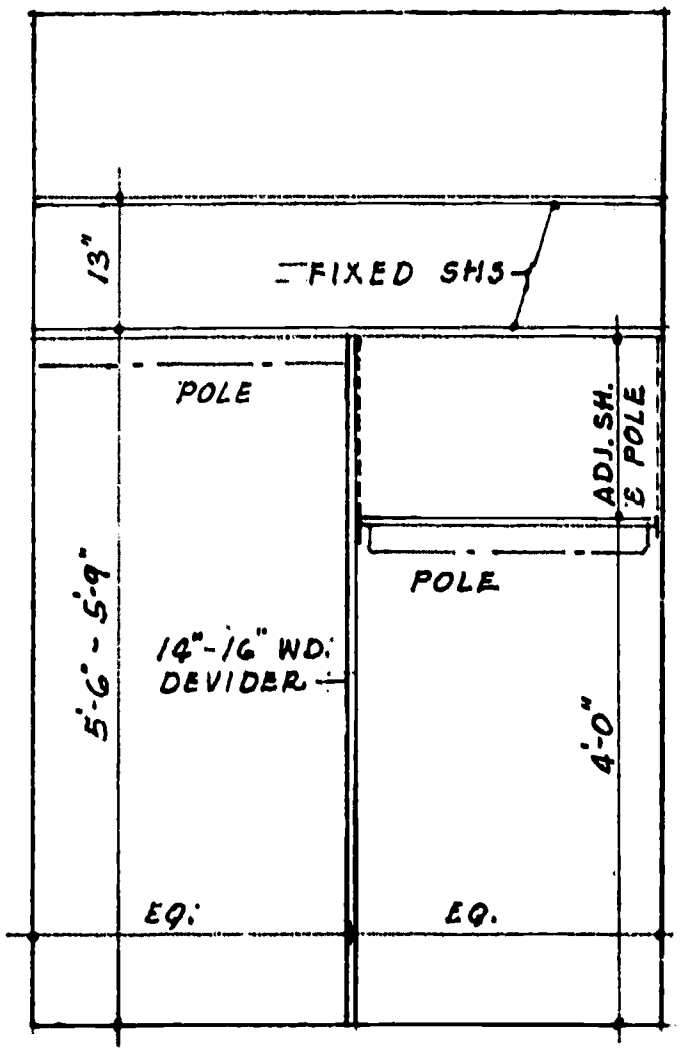


Figure 18. Two-person Bedroom Closet. Coat closet same but smaller.

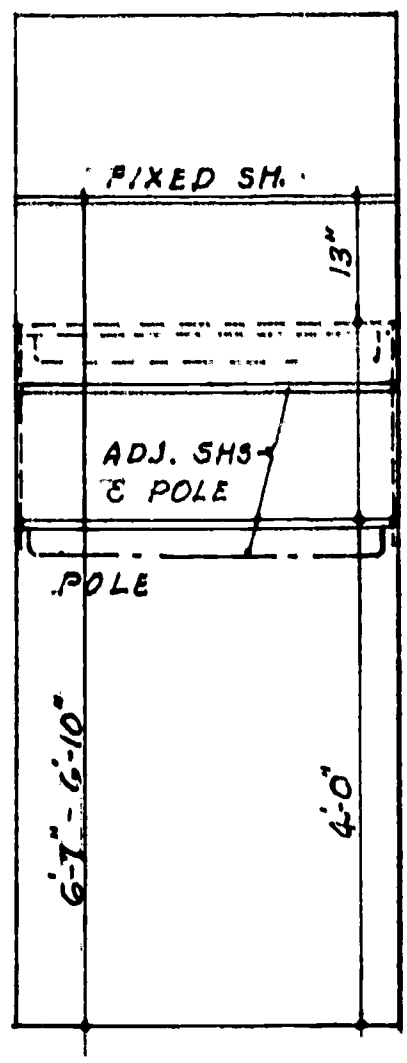


Figure 19. One-person Bedroom Closet. Coat closet same but smaller.

For one-person dwellings, the coat closet shelves and pole should be made adjustable. For larger dwellings, both the standing position height and the adjustable wheelchair height should be provided by dividing the closet with a wood partition.

The bedroom clothes closet should be divided by wood partitions into two sections, one with shelves and pole for the standing position height and the other adjustable for the wheelchair user.

The linen closet shelves should be adjustable in height, from the baseboard up. Persons in a sitting position can easily reach low shelves, but low shelves are difficult for those on crutches. The linen closet often stores items other than linen, such as clothes hamper, bathroom supplies, etc. Adjustable shelves provide the needed flexibility.

A storage unit should be provided for storing supplies and cleaning equipment, ironing board, canned goods, etc. The unit need not be in the kitchen, but it should be easily accessible from the kitchen. It may be a standard prefabricated cabinet resting on the floor or a built-in closet.

A general storage area and kitchen storage space may be combined if located conveniently to the kitchen.

Although the general storage area is not primarily designed for the storage of excess furniture, it should be large enough to store foot lockers, suitcases, vacuum cleaner, large and seldom-used cooking utensils, work clothes and shoes, and—in large family units, folded baby furniture and toys.

Increasing the amount of storage space does not always economically resolve the storage problem. The best use of available space can be made by careful arrangement of varying shelf widths adjustable for height and use of hook strips for hanging such items as brooms, mops, vacuum cleaner hose, etc.

Windows

The following hazards should be avoided when selecting and installing windows: windows that project, outside or inside, beyond the wall line, and protrude in the path of persons walking; windows that require climbing or leaning out to clean; window stools too low to provide adequate safety from falling, or high stools which block the view from a sitting or bed position. The recommended window stool height is 28 to 32"; can be at floor if opening on terrace or balcony.

Housing Authority of the City of San Antonio.

Windows should be easy to operate, lock and clean. Operating and locking hardware should be located for convenient reach from a sitting or a standing position and be of the type easily grasped by arthritic or otherwise impaired hands.

The ideally safe window has not yet been manufactured. The only thing to do, therefore, is to select the type requiring fewest compromises. Types deserving consideration are:

- The modified double-hung window which, in addition to sliding up and down, permits each sash to pivot and swing inward for cleaning—no interference by insect screens or storm panels when used, or curtains, shades and venetian blinds.
- The awning type with push bar or rotary gear operator set below the screen (some of these windows require the screen unit to be removed to clean the window, others permit the swing panels to reverse when fully opened for cleaning the outside glass surface). Cleaning of upper glass may be difficult for some.
- The hopper type, somewhat similar to the awning type except window units open inward and screen is on the outside. This type window may interfere with draperies and shades, and may project inward to the point of being a hazard.
- Horizontal sliding windows. Cleaning of upper glass may be difficult for some.

Aluminum windows coated by the manufacturer for protection during shipping and installation have some advantage over windows requiring maintenance painting.

Window items which increase maintenance costs should be avoided. Dissimilar metals that cause galvanic corrosive action in the presence of moisture should not be used. The best rust prevention for steel is hot-dip galvenizing. To prevent condensation and early deterioration, a thermal break is advisable between metal windows (steel or aluminum) and butting interior materials, such as plaster or metal jamb liners. Window stools are subject to hard usage from flower pots and other heavy objects. Glass glazing compounds which harden make glass replacement expensive; vinyl or snap-in beads are recommended.

Two curtain rods or tracks, as well as venetian blinds or shades, should be provided for windows. "Ring" pull trim on pull-down blinds or shades is convenient for many impaired persons who use a device with a hooked end for many things. Venetian blinds are practical, though difficult to clean. A Local Housing Authority study on the economic feasibility of providing draperies at project expense in lieu of other light control media was inconclusive. The general tendency toward excessive glass areas makes the cost to the tenant of providing suitable glare-controlling and cold-retarding draperies unreasonably high.

Doors and Hallways[10]

The entrance door to the dwelling should be at least 2′–10″ wide if door opens 180°, otherwise 3′. There should be no entrance step or riser. Any threshold should be at least 5″ wide, featheredged to floor and projecting no more than ½″ above the floor.

[10] *For electrical magnetic entrance door lock, see p. 38.—Emergency Signal System.*

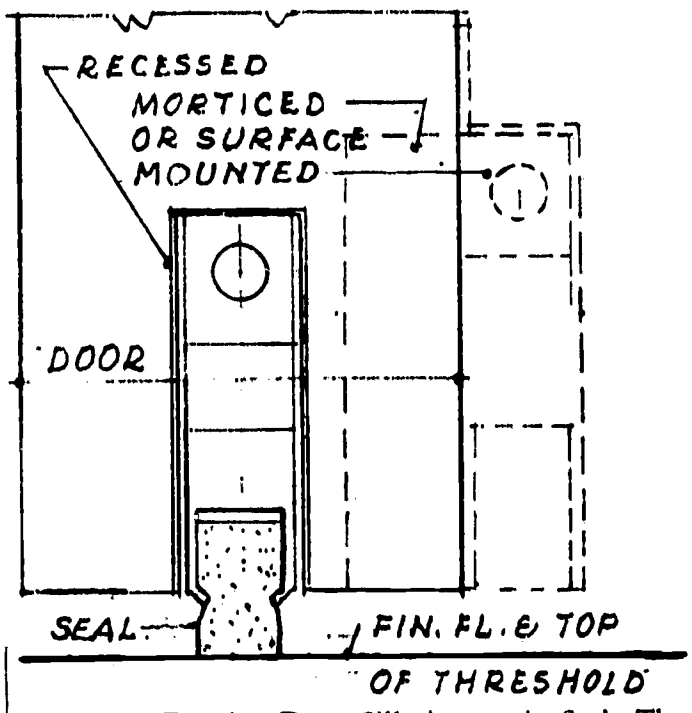


Figure 20. Exterior Door Sill Automatic Seal. The weather seal automatically lowers when door is fully closed, raises when door begins to open. The clearance between door and floor varies from a quarter of an inch to one inch or more. The threshold can be flush with the finished floor.

(Housing Authority of the City of San Antonio.)
Threshold flush with floor. Surface mounted automatic door seal. Louvered and screened exterior door.

(Housing Authority of the City of San Antonio.)

Card holder with name of tenant, name and telephone number of relative and doctor on back of card, especially desirable when occupant is elderly also some impaired.

Letters or numbers identifying the dwelling should be visible day and night. Raised numbers are more easily seen by those with poor vision and can be felt by the blind. It is also helpful to have color variation on doors or elsewhere near the entrance. Entrance doors leading directly from the outside should have a protective hood or canopy.

The proper width of pass-through doors within the dwelling depends upon wheelchair dimensions and the ability of the individual to operate the chair. Overall dimensions for the standard wheelchair are 24 to 26″ wide, 42″ long and 36″ high. Special purpose wheelchairs are not covered herein; they are larger and require more maneuvering space.[11]

[11] *Consult local supplier or manufacturers, such as Everest and Jennings, Inc., Los Angeles, Calif., 90025; J. A. Preston Corp., 175 Fifth Avenue, New York, N.Y.*

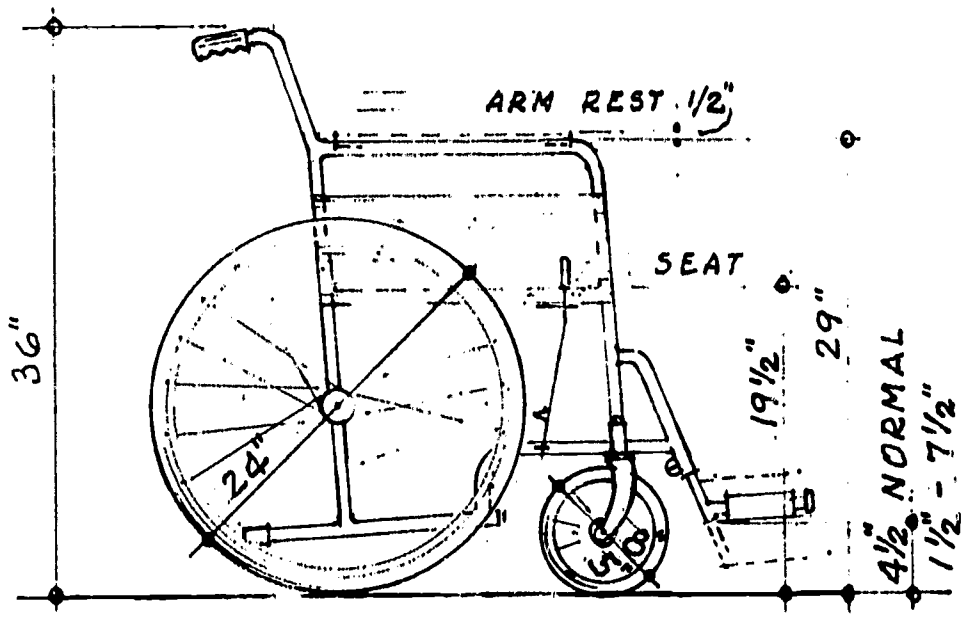


Figure 21. Side View Standard Adult Wheelchair.

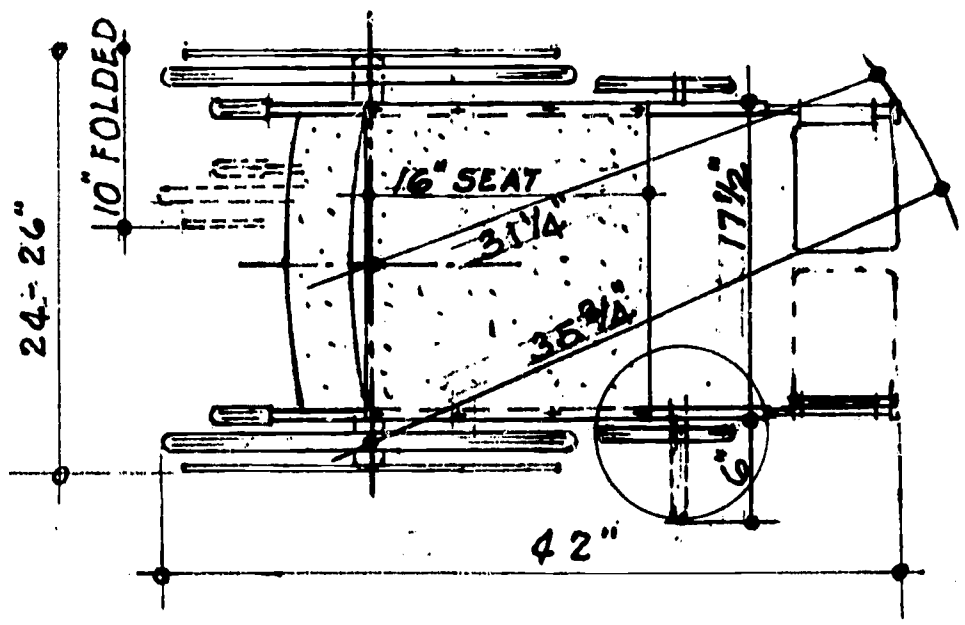


Figure 22. Plan View Standard Adult Wheelchair.

The pass-through dimensions that follow, which are identified as "minimal," represent what the standard American wheelchair is capable of negotiating; the "recommended" dimensions represent what *most* wheelchair users can negotiate:

- Hallways in the dwelling: To permit 180° turn, 4′ minimum width, 4′–6″ *recommended.*
- Pass-through door—straight line travel: 2′–8″ minimum if door opens 180°; otherwise, 2′–10″ *recommended.*
- Pass-through door—90° wheelchair turn from hallway: 2′–10″ door and 3′–4″ hallway *recommended;* or 3′ door and 3′ hallway *recommended.*

Closet doors and other nonpass-through doors, 2′–6″ minimum width—horizontal sliding or folding doors are easiest to operate from a sitting position, and they eliminate the danger, especially to the blind, of walking into the edge of a partially open door.

Hinged bathroom doors should swing *outward,* to remove collapsed person. If the latch includes a lock feature, it should be the type that can be released from the outside. Sliding or folding doors are satisfactory. Two-way swinging doors are hazardous and should not be used.

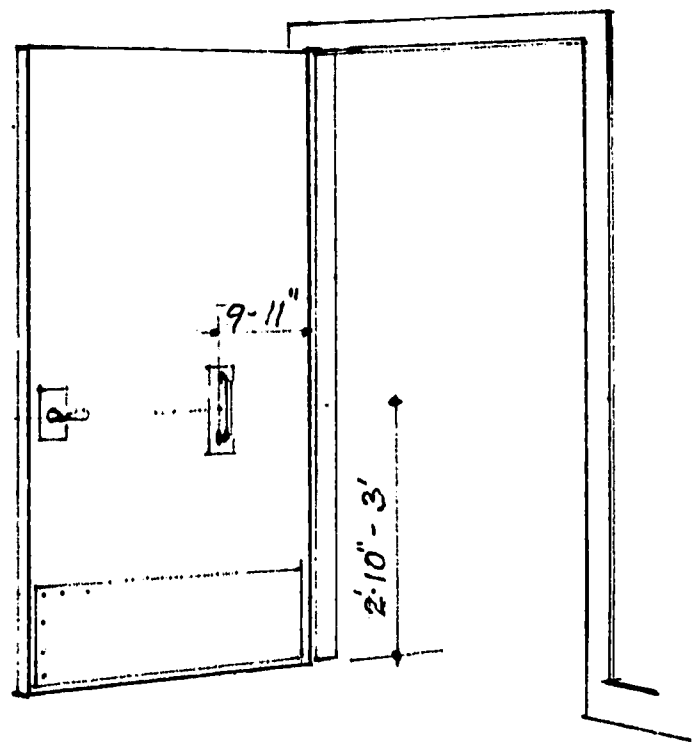


Figure 23. Dwelling Entrance Opening Out. Door pull assists a wheelchair user to pull door shut on entering. The door pull should be on the outside for an inward opening door.

Operating hardware on doors should be 2′–10″ to 3′ above floor for all doors in the dwelling, including entrance door. Round or oval door knobs are the most difficult for impaired hands to operate. Lever handles with ends looped back to the door surface to prevent catching of clothing, etc., are best for operating a latch or lock. Pull handles should be of simple design with no hooks to catch clothing and with both ends returned to the door. A 5″ or more door pull handle, mounted on the hinge side, is convenient for pulling the door shut from a wheelchair.

By Architectural Adviser.

Kick plates on the entrance door are desirable to reduce damage and door maintenance caused by wheelchair foot rests and wheel hubs. Such damage to interior doors may not be a serious problem, because families with wheelchair users usually leave interior doors open for their convenience.

Thresholds *should not* be installed at interior doors or openings.

Floors

For the physically impaired, floor surface materials should have nonslip properties. Some materials are satisfactory when dry but dangerous when wet, and therefore should not be used in the bathroom, kitchen or near the entrance doors when these doors are in the exterior walls. Slippery floor surfaces are particularly dangerous to users of canes or crutches, when the rubber ferrules become wet or the floor is wet. Non-slip polishes in liquid or paste form are available and their use is suggested.

Bare concrete floors are *not* recommended. Carpeted floors, for low-rent housing, cost more initially and in the long run than other suitable floor materials. Carpets need underpads to extend their life and, due to the effort needed to propel a wheelchair, are not desirable for wheelchair users who have arm or hand impediments. Carpet shampoo and stain removal should not be expected of tenants, burns caused by cigarettes may also be a problem.

Floor materials which require special maintenance equipment or treatment should not be installed inside the dwelling; such floor care must be accomplished with equipment generally owned by the tenants.

Floor materials of intermediate colors with a patterned surface should be selected. Very dark or light surface, especially solid color, show dirt more readily.

Although gray rubber tires are available for wheelchairs, some wheelchairs have black tires which mark floors when the wheels slip or slide rather than roll. This marking is more of a problem with old tires on highly polished than on high-traction floors.

For the bathroom and shower, unglazed ceramic floors are recommended. The smaller-sized tiles (2″ or less) provide some friction at the joints and therefore greater safety. For similar reason, square-edge tiles are more suitable than those with a cushion edge. Coved base makes for easier floor cleaning.

Kitchen floor materials should be grease-resistant. The best materials are those which can be kept clean with warm water and detergent, such as vinyl asbestos, which in general is taking the place of grease-proof asphalt tile.

Floor materials for other dwelling space may be asphalt tile (in the midrange colors), vinyl asbestos, or hardwood. There are numerous wood floor finishes that require little maintenance, such as those formulated with Poly Urethane (an excellent finish) or Epoxy.

Lighting, Telephone, Television, Emergency Signal System

Lighting. All light fixtures should be controlled by wall switches. The switches should be uniformly located 2′–10″ to 3′ above the floor and not over 8″ from door jamb at latch side of door. A receptacle (not switch controlled) should be combined at some locations with switches, for convenient use of a vacuum cleaner. Tap-type or rocker switches are best for persons with hand impairment. Light fixtures located at a height permitting the tenants to replace light bulbs without using a step ladder are desirable. One way to eliminate this hazard is by the use of a floor or table lamp for room lighting. For this purpose, one receptacle of a wall duplex outlet, conveniently located, should be switch controlled at the room entrance.

Adequate light should be provided outside entrance doors so that residents can easily locate their door locks at night. Higher than normal lighting intensity is needed by most elderly and some impaired persons, especially in the kitchen and bathroom.

Wall receptacles should be uniformly placed 18 to 24″ above floor to reduce the physical effort of bending. Only those wall receptacles placed above kitchen counters and in dining areas should be mounted higher. Twin wall receptacles are inexpensive and are less hazardous than the cheap substitutes often purchased by tenants.

For safety, the switch(es) controlling electrical outlets in the bathroom should be located outside the bathroom door, unless the return wire and the outlet box are grounded.

In low-rent housing, electrical outlets for tenant-owned wall or window air-cooling equipment are permitted subject to approval by HUD-HAA.[12]

The dwelling circuit panel should be located at a height convenient for the wheelchair users. The circuit panel must be of the "dead front" type. Circuit breakers are preferred to plug fuses.

Telephone. In a one-person dwelling, provision should be made for a telephone outlet near the head of the bed and in all other dwellings, between the beds of the first bedroom. A second telephone outlet could be placed in the living room of dwellings with one or more bedrooms. Some telephone companies will install one plug-in instrument in a dwelling with more than one plug-in outlet. Most low-income tenants cannot afford the monthly expense of two instruments.

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[12] *See HUD-HAA Low-Rent Housing Manual Section 207.1.*

American Telephone and Telegraph Company.[13]

In developments assisted by HUD-HAA, a central telephone switchboard is not recommended because of the manpower operating cost and its resultant effect on rents. To operate the switchboard 24 hours a day, 365 days a year, on a 40-hour work week, 4.5 persons are required, taking into account: sick leave, annual leave and legal holidays. On a 200-dwelling project, the rent increase per unit per month would be between $4.00 and $5.50.

A house emergency telephone and/or other signal device should be installed in each elevator cab.[14] The answering service should be in the management office and the custodial apartment, or other 24-hour service if found to be economical.

Television. A television antenna system should be provided when needed for good reception. In developments assisted by HUD-HAA, need for such a system is predetermined through an on-site reception test, unless the determination can be made by inspection of existing neighborhood televisions.

Emergency Signal System. The system would include one large diameter push button in the bathroom, and another near the head of the bed in a one-person dwelling, and between the beds of the first bedroom in all other dwellings. Both push buttons activate an audio and visual unit located outside the dwelling. A third unit, which can be activated simultaneously, should change the dwelling entrance door from locked to unlocked. The activated unit should be continuous duty, allowing it to remain in operation until reset. The audio unit tone should be distinct and should differ from the fire alarm. A secondary power supply should be considered for the emergency signal system and the fire alarm.

The audio and visual units may be located outside the entrance door, inside an adjacent dwelling, or in a central location. Units at the entrance door depend upon attracting the attention of a neighbor or a passerby to investigate. Units within an adjacent dwelling might create a management problem and possible friction between tenants. A central location is only partially effective unless attended on a 24-hour basis. It is not recommended, for the same cost reason given against the use of central telephone switchboard. If a signal panel is provided, consider locating it within the custodial dwelling.

The central station system cost is approximately $150 per dwelling. The system with audio and visual units at the entrance door, plus door lock release, costs approximately $75 per dwelling. The door lock release in both cost figures is $15.00.[15]

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[13] *The artificial larynx device has aided many persons to speak again after losing their voices through paralysis or surgery. The device is distributed on a nonprofit basis by the Bell Telephone Companies. Consult your local telephone company for available special telephone devices.*

[14] *For information, see HUD-HAA Guide Specifications Division 33, also Bulletin No. LR-10, Part III.*

[15] *All costs are national averages for 1966.*

Heating

The heating system should be designed to maintain room temperature of 75°F. for the physically impaired or elderly.

Exposed vertical heating risers and exposed radiators are dangerous. Such equipment can cause severe burns to persons who, in portions of their bodies, have little sensation to heat. All vertical heating pipes should be concealed and radiators covered with cabinets.

In bathrooms, the use of a ceiling-type heat lamp, thermostatically controlled, and operated by a manual wall switch is recommended as safe and economical, providing instant heat day or night. Exposed heaters, radiators or heat riser pipes are not safe and should not be used.

In multistory structures, a central heating plant is generally most economical. For one-story structures, a central heating plant is costly, due to the installation of distribution mains. Either forced warm air or forced hot water as individual units or group plants could be used for one-story structures. The final determination should be based on a detailed utility analysis.

Excessive window glass areas increase heat loss and therefore fuel cost. In summer, rooms with a south or west exposure receive the rays of the hot afternoon sun, which raises the temperature in the unit. Large glass areas exposed to summer sun or winter cold require curtains or draperies, an expensive tenant item.

Whatever form of heat is provided, tenant control is recommended, preferably by thermostat or in the case of radiators, shut-off valves.

Domestic Hot Water

In warm climates, individual water heaters installed in a closet with outside entrance makes for ease of maintenance, and facilitates management control of water temperature setting.

Custodial Dwelling

The need for a custodial dwelling unit should be considered. Such dwelling should be centrally located and have at least two bedrooms, to suit the housing needs of a couple with children. In a multistory structure, the custodial dwelling should be on the ground floor.

To have the custodian living within the development is desirable and necessary for the physically impaired and the elderly. Therefore, justification for including a custodial dwelling should show the number of tenants who are impaired or elderly.

Although the custodian is an employee with specific work assignments, he should be available for emergencies when off duty. The custodian's wife might be available during the day; however, in most developments there is a management office open during working hours.

Community Space

General

The following recommendations apply particularly to multiuse community space and to those less specialized community facilities most frequently developed in conjunction with residential housing developments.[1] Local considerations will govern the number and nature of specialized community facilities developed in combination with a residential facility for the physically impaired. Because the range of possibilities in such specialized facilities is so vast —from health clinics to sheltered workshops offering specific types of employment opportunities—anyone undertaking to design them should consult with program directors.

Before the architectural plan and functional layout of the community space can proceed, the local need and available services should be explored in cooperation with local agencies which will finance the staffing[2] and operate the space after it is constructed.

Since the maximum space permitted is determined by the number of families in each development, it is not possible to provide in all developments, especially the smaller ones, space for all activities. The space planning for some areas should provide *for functional use of the maximum number of activities.* Areas or spaces generally considered desirable are: a lounge combined with the entrance lobby; group recreational space with kitchen; craft area; library; clinic; facilities, such as toilets, public telephones, drinking fountains and vending machines especially designed or arranged for

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[1] *For established maximum area community space ratios, see HUD-HAA Low-Rent Housing Manual Section 207.3, which also covers commercial space.*

[2] *The professional physically impaired should, for obvious reasons, be given preference for positions and where nonprofessional staff can be used, qualified tenants should be considered.*

orthopedic equipment users; and a separate space for the resident children's activities.

More community-space floor area than the HUD-HAA can finance may be permitted in low-rent housing developments when other funds are available to finance the additional construction.[3]

Space to be allotted as a health clinic should be planned as a separate functional unit. Health clinic space rarely can be combined with recreational or other space.

Indoor community space should be closely related to outdoor recreational areas with easy access and no intervening stairs or steps. Indoor space should have natural light and ventilation with pleasant outward views. It is not desirable to locate community space in basements or on roof tops detached from outdoor recreational areas. Roof-top facilities would increase the use of elevators by tenants traveling from the roof to outdoor recreation, by delivery to the kitchen, by staff, visitors, invited guests and by persons outside the project reporting to the clinic. Further, children could not be prevented from wandering in upper corridors.

In general, floor surfacing suitable for the dwelling area is suitable for indoor community space. It may be advisable, however, to install nonstaining flooring in certain special use areas, and more durable flooring—such as nonslip terrazzo, unglazed tile or quarry tile —in corridors, entrance lobbies, and other concentrated use areas.

General illumination should be of multiple control to allow for varying degrees of intensity. The maximum should be at about 30 foot-candles at table height. Supplemental movable lights (floor and table lamps in the lounge and library) should be provided at required utilitarian locations for decorative and functional use. Avoid creating hazards by exposed extension cords to floor and table lamps.

There should be no hazards, such as thresholds within the community space; free standing columns; pilasters; projecting radiators or drinking fountains.

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[3] *See HUD-HAA Low-Rent Housing Manual Section 207.3, which also covers commercial space.*

Air conditioning of all community space used by physically impaired or elderly should be considered.[4] Most physically impaired persons consume more energy or calories in performing tasks than the nonimpaired. The result is increased body temperature which is further complicated with poor ability to cool the body by sweating. Thus air cooling for comfort is more necessary for the impaired than the nonimpaired.

Lounge

When combined with the entrance lobby of a community building, or the elevator lobby of a multistory structure, a lounge provides increased activity and interest. The elderly and the impaired enjoy watching the going and coming of tenants and visitors. In cold climates a vestibule entrance is necessary.

Locating the mail delivery room in the elevator lobby near the lounge is recommended.

The décor of the lounge should be coordinated—wall colors, white ceiling, accent colors —in draperies, furniture, lamps and plastic or cloth upholstery materials. Woven cloth upholstery material used in the lounge must be stainproof. Funds for nearly all of these articles can be supplied by local clubs and organizations. Such participation provides an excellent means of tying in community interest to the development's inhabitants.

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[4] *For air conditioning, see HUD-HAA Low-Rent Housing Manual Section 207.1.*

Bill Driver and Nashville Housing Authority.

Selection of chairs and sofas for the physically impaired, especially the semiambulant, deserves special consideration. Seat height 18″ above floor is best. Some standard equipment may be fastened to blocks in order to raise the seat height. Sturdy arm rests help the impaired to rise. Chairs should not overbalance when weight is applied on the arm rest. Deep seats (over 20″) are undesirable. Semistiff, upholstered furniture is recommended.

In low-rent housing, a reasonable amount of general-purpose furniture and furnishings for educational, recreational, and welfare programs may be provided with HUD-HAA funds.[5]

Recreation or Multipurpose Room

This space may be subdivided by sliding or folding soundproof dividers or doors—the ceiling should be acoustically treated. The space should be suitable for meetings, movies, concerts, plays, lunches, etc. Because of the nature of such activities, convenient storage space for tables and other items should be provided. An inventory of the items is needed to adequately plan an orderly and functional storage—flexibility of use with adjustable shelves is desirable.

Building codes may require emergency exits but at least one exit door may be desirable for departing guests after evening affairs.

Structural columns or other obstructions within this space should be avoided or eliminated if possible in order that the space may function as one room for certain occasions.

Tables without aprons which will permit wheelchair arms to fit underneath are recommended—they also take less space to store.

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[5] *See HUD-HAA Low-Rent Housing Manual Section 208.3.*

Kitchen

A kitchen should be provided adjacent to the recreation room. Equipment and arrangement should facilitate efficient and functional food preparation and clean-up. The kitchen may be used by the tenants to prepare food for luncheon parties of small groups, teas, birthday parties, or perhaps coffee or snacks for small groups.

The kitchen should be planned and designed to be useful in demonstrating and instructing on food preparation, in planning balanced diets, and in conducting various consumer education activities. For this purpose, the division between the recreation room and kitchen should be a sliding or folding divider or doors which can be locked or secured.

A two-door refrigerator freezer with automatic defrosting food compartment is recommended. In large kitchens, consider how best to provide cold drinking water.

A kitchen service entrance should be planned to accommodate delivery of supplies, catering service, and garbage and trash removal. A garbage grinder may be installed in this kitchen —the continuous-feed type is recommended.

Floor and wall surfaces should be of easily cleaned materials and finishes. Wall cabinets should have adjustable shelves. At least one closet, with lock, for storage of staple supplies should be provided, as well as a cabinet for mops, brooms, and cleaning materials.

Craft Activity Area

The space for craft activities should have maximum flexibility for varied arrangement. Fixed partitioning of cubicles is *not* desirable —no flexibility. It is best to concentrate the craft space in one room, dividing the space with movable (on casters with step-on brakes) wood storage cabinets for materials and supplies. This provides for multiple use of space and permits adapting space size to tenant interest and various activities.

The divider movable cabinets should not extend to the ceiling. A height of about 4′ provides views when standing, improves ventilation and distribution of light; further, no

change in the prearranged distribution of air conditioning is required. The cabinet units should be of sizes easy to move. Standardized units are advisable, but they should be selected or designed for the materials and supplies to be stored. It is also advisable to have cabinets that can be locked and shelves that can be adjusted. Some drawer-type storage space may be desirable. Apronless tables are recommended.

Toledo Metropolitan Housing Authority.

Special consideration should be given to providing outlets for both 110 and 220 volts in craft activity area—consult with operating staff.

Library

The larger community spaces may provide, if need is established, an area for a branch of the city library, which will furnish book stacks. When the book stacks can be locked or otherwise segregated from the rest of the library, then the area generally used for reading could on occasion be used for small gatherings or other uses—again flexibility. If possible, this space should be large enough for apronless tables, and chairs. Since smaller projects seldom can afford a separate library, the lounge may be provided with adjustable shelves for books and periodicals. This same idea, while less desirable than a separate library, may be considered for large projects.

Health Clinic

A clinic can contribute substantially to the welfare and continued independence of the elderly and physically impaired. Clinic space may be provided [6] when such facilities are not available near the site. However, it must be furnished, equipped, and operated with funds from sources in the local community, usually a health agency which must be consulted and must approve the architectural plan.

In small developments, the permissible clinic space may consist of an office and examination room for use of doctors and nurses who visit during scheduled periods.

In larger developments, space for a variety of health services may be provided, including physical therapy and hydrotherapy, a special need of the physically impaired. Occupational therapy may be conducted in the craft activity area. This type of clinic would generally be active each work day and should have a waiting room with a separate outside entrance permitting nontenant patients to come and go without traversing the lobby or lounge.

Wash Rooms

Separate wash rooms for each sex should be provided in community space. At least one water closet compartment for the semiambulant and wheelchair user should be provided in each wash room, in addition to other plumbing fixtures.

The wash rooms should be located to permit convenient use by outside visitors to the clinic and tenants using the various activity areas.

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[6] *See HUD-HAA Low-Rent Housing Manual Section 207.3 for special local commitment.*

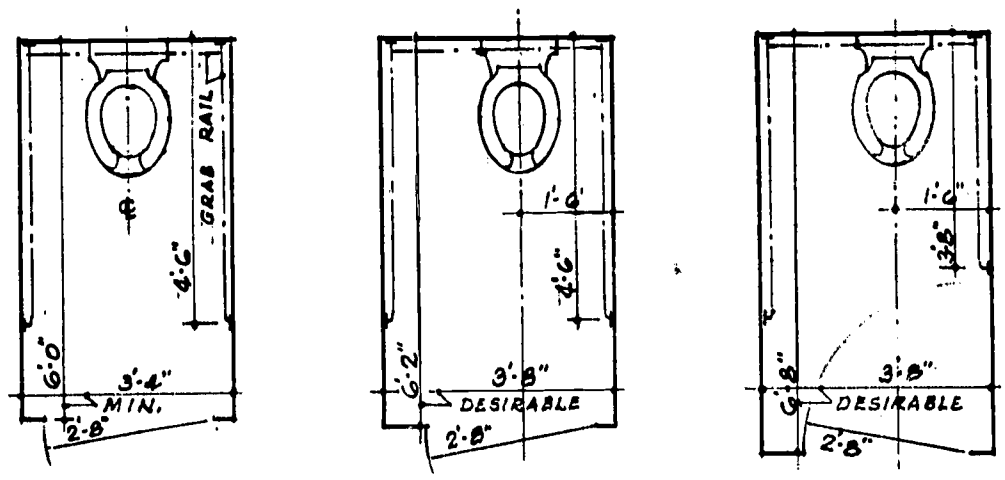


Figure 24. Figure 25. Figure 26.

Toilet Stalls. Figure 24 is minimal with toilet and door centered in the stall. Figures 25 and 26 are desirable with the toilet and door centered on each other and off center in the stall. Stall door opening out is desirable.

The three toilet stalls illustrated in Figures 24, 25 and 26 are all possible solutions for persons using wheelchairs or other walking aids. Figure 25 would be best suited for all physically impaired; 24 is usable but slightly cramped for the wheelchair user; 26 would require slightly more maneuvering of the wheelchair than 25.

Maximum maneuverability for persons using crutches or wheelchairs is provided in toilet stalls, with the toilet fixture set toward either side wall.

Horizontal grab bars should be installed on the side and rear wall of the water closet compartment. Such bars (1½″ outside diameter) should be at least 4″ from the wall to prevent pinioning the wrist, hand or arm in case of a fall. Grab bars should support 250 pounds.

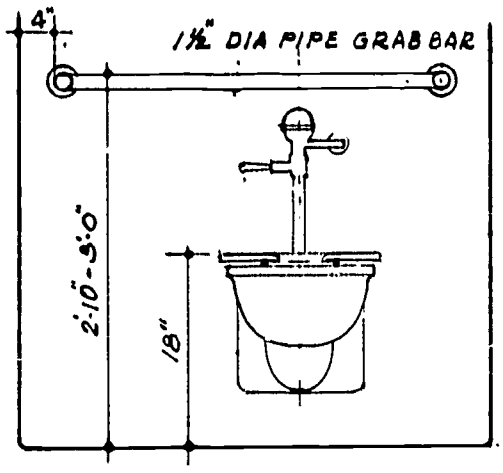


Figure 27.

Wall-hung Toilet—desirable.

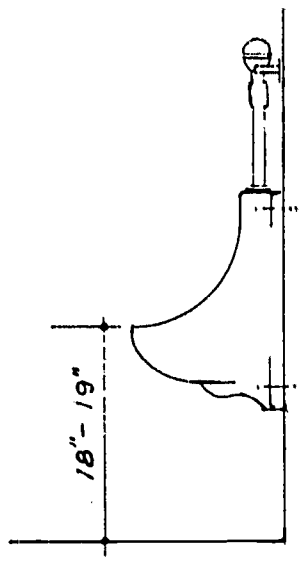


Figure 28.

Wall-hung Urinal.

Public Toilets for the Semiambulants and the Wheelchair User. The grab bar above the toilet provides assistance to persons making a frontal approach to the toilet.

The water closet seat should be 18″ above the floor. A wall-hung closet is most suitable for the semiambulant person—also makes for ease of floor cleaning and sanitation.

Urinals in the men's room should be of the wall-mounted type for the same sanitary reason given water closets. The front lip of the urinal should be 18 to 19″ above the floor, which is convenient for persons in wheelchairs and others.

The installation of lavatory and wall mirrors is discussed in the chapter on Dwelling Units under Bathroom.

A separate staff washroom which can be used by both sexes should be provided in the clinic—two washrooms in the large clinic.

Public Telephones, Drinking Fountains, Vending Machines

Public Telephones. The standard public telephone booth is not usable for most physically impaired people.

To assist persons with hearing disabilities, telephone receivers should have adjustable amplifiers.

American Telephone and Telegraph Company. Adjustable volume control handset for impaired hearing.

The new punch dial receiver is more desirable for the impaired than the rotating dial.

The standard coin box receiver mounted above the table or shelf elevates the coin slot 4′ above the floor, which is not convenient for some with physical impairments. A desk-type telephone, resting on a table or shelf about 31″ above the floor, is the most convenient (bottom of shelf must clear wheelchair arm rests). For wheelchair users, the desirable height for coin slots is about 3′ above the floor or 6″ above the counter top.

The local telephone company should be consulted for advice regarding available special and standard equipment which is especially desirable for the physically impaired.

Drinking Fountains. The standard adult drinking fountain is satisfactory to all except wheelchair users. For wheelchair users, the fountain bubbler should be 31 to 33″ above the floor. Two-level drinking fountains that satisfy both standard and wheelchair height requirements are available, or a low-level unit can be added on the standard fixture. Persons in wheelchairs can use a children's drinking fountain 31″ high. Push-button control is best for persons with impaired hands. Some drinking fountains are available with both hand and foot control.

Drinking fountains with paper cup dispensers should have the dispensing mechanism 30 to 34″ above the floor. Drinking fountains resting on the floor, projecting into the corridor are a hazard; recessing into wall pockets makes floor cleaning difficult.

Vending Machines. The need for and location (not in prominent view) of vending machines which dispense soft drinks, etc., should be considered.

Other Areas

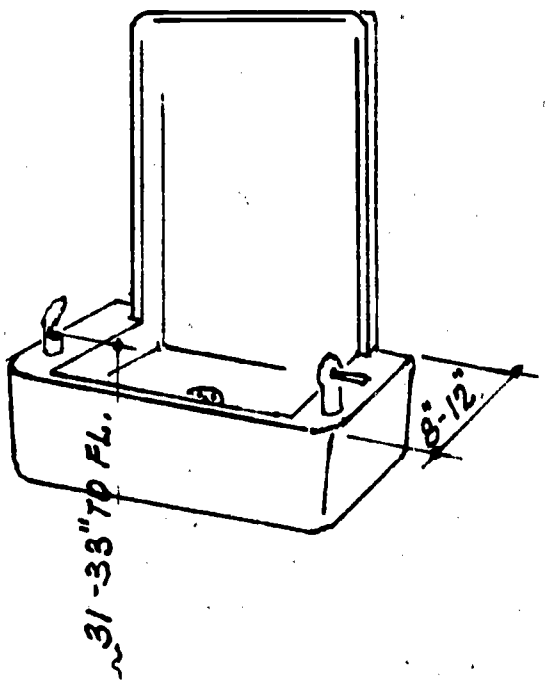
The minimum corridor width should be 6′. Grab rails should be provided on each side wall. (See chapter on Dwelling Structures for special assistance to those with poor vision.) The minimum door width should be 3′. Doors from the corridor to the various rooms, when fully open, should not extend into the corridor. They are a hazard, especially to persons with poor vision.

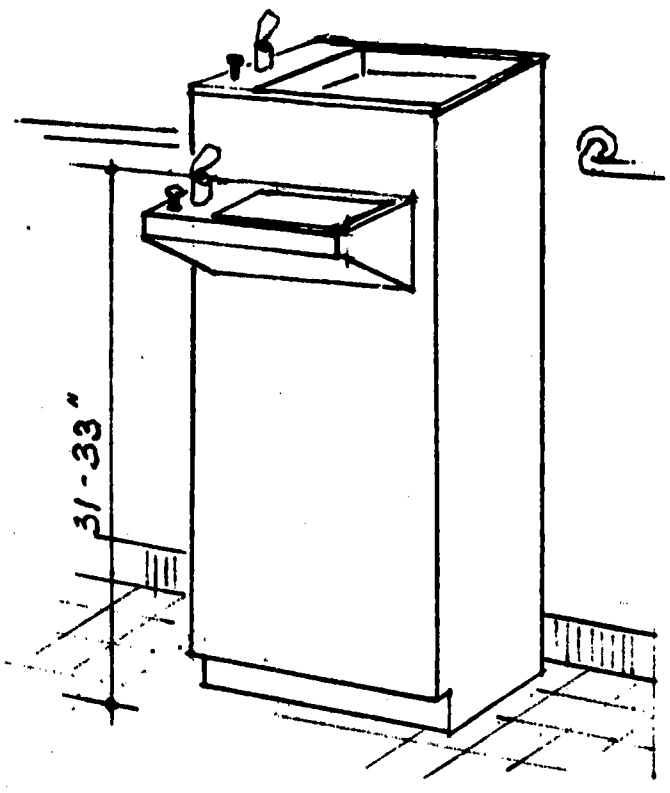
Consideration should be given to the need for a staff management office. In multistory buildings, such an office should be located to provide an unobtrusive view of the lobby entrance and elevators.

Office space in which tenants may, in privacy, discuss problems with counselors, and for other uses, should be considered.

Consideration also should be given to temporary coat and umbrella storage facilities for tenants and visitors using the recreation or multipurpose rooms. This facility is best located where it can be visually supervised. Closed cloak rooms should be avoided.

Certain rooms and storage areas will require locked doors.





Drinking Fountains for Wheelchair Users.

Figure 29. Semirecessed model with projecting basin *is recommended* because the wheelchair approach is parallel to the wall. A frontal approach is difficult. Two units may be connected to one water chiller. The second unit should be set 40 to 42″ above the floor and 5 to 6′ from the other. The water stream rises about 4″ above the bubbler orifice.

Figure 30. The floor cabinet model is available with an additive basin; while this two-level unit would serve the dual use, it is *not recommended* because of the hazard created to persons with poor vision and to blind persons who will be using the wall handrail.

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